

Appendix A. Literature Search

MEDLINE (5/26/15 6553 citations)

((otitis) OR ("glue ear") OR "Otitis Media with Effusion"[Mesh] OR "Otitis Media, Suppurative"[Mesh] OR "Ear, Middle/secretion"[Mesh] OR (middle and ear and (effusion* or infect* or inflame* or disease*)) OR ((OME OR SOM or AOM) AND (otitis OR ear)) OR ((mucoid* AND middle AND ear) OR (mucous AND middle AND ear) OR (seromuc* AND middle AND ear)))

AND

(tympanostomy OR grommet* OR ((ear or "pressure equalization" or PE or myringotomy or ventilating or ventilation) and (tube or tubes)) OR "Otitis Media with Effusion/surgery"[mesh] OR "Middle Ear Ventilation"[Mesh] OR ((middle AND (ear OR tympanic)) AND (tube or tubes)) OR "Otologic Surgical Procedures"[Mesh] OR T-tube or tabulation)

COCHRANE: (7/13/15 393 citations)

((otitis) OR ("glue ear") OR [mh "Otitis Media with Effusion"] OR [mh "Otitis Media, Suppurative"] OR [mh "Ear, Middle/secretion"] OR (middle and ear and (effusion* or infect* or inflame* or disease*)) OR ((OME OR SOM or AOM) AND (otitis OR ear)) OR ((mucoid* AND middle AND ear) OR (mucous AND middle AND ear) OR (seromuc* AND middle AND ear)))

AND

(tympanostomy OR grommet* OR ((ear or "pressure equalization" or PE or myringotomy or ventilating or ventilation) and (tube or tubes)) OR [mh "Otitis Media with Effusion/surgery"] OR [mh "Middle Ear Ventilation"] OR ((middle AND (ear OR tympanic)) AND (tube or tubes)) OR [mh "Otologic Surgical Procedures"] OR T-tube or tabulation)

CINAHL (7/13/15 852 citations)

((MH "Otitis") OR (MH "Otitis Media with Effusion") OR (MH "Otitis Media") OR otitis OR ("glue ear") OR (MH "Ear, Middle") OR (middle and ear and (effusion* or infect* or inflame* or disease*)) OR ((OME OR SOM or AOM) AND (otitis OR ear)) OR ((mucoid* AND middle AND ear) OR (mucous AND middle AND ear) OR (seromuc* AND middle AND ear)))

AND

(tympanostomy or myringotomy OR (MH "Middle Ear Ventilation") OR grommet* OR ((ear or "pressure equalization" or PE or myringotomy or ventilating or ventilation) and (tube or tubes)) OR ((middle AND (ear OR tympanic)) AND (tube or tubes)) OR (MH "Ear Surgery") OR T-tube or tabulation)

EMBASE (7/14/15 5556 citations)

(otitis OR 'otitis media'/exp OR glue ear OR (middle and ear and (effusion* or infect* or inflame* or disease*)) OR ((OME OR SOM or AOM) AND (otitis OR ear)) OR ((mucoid*

AND middle AND ear) OR (mucous AND middle AND ear) OR (seromuc* AND middle AND ear)))

AND

(tympanostomy OR 'tympanostomy tube'/exp OR 'myringotomy'/exp OR 'middle ear ventilation'/exp OR grommet* OR ((ear or "pressure equalization" or PE or myringotomy or ventilating or ventilation) and (tube or tubes)) OR ((middle AND (ear OR tympanic)) AND (tube or tubes)) OR T-tube or tabulation)

Appendix B. Excluded Studies

PMID	Authors	Title	Journal	Rejection Reason
none	Diacova S. and Desvignes V. and Chiaburu A. and Chirtoca D. and Parii S.	Tympanostomy and adenoidectomy for treatment of otitis media in children	Archives of Disease in Childhood	Abstract only
none	Cheng L. and Chen S. and Cheng J.	Does tube type matter in posttympanostomy tube otorrhea?	Otolaryngology - Head and Neck Surgery	Abstract only
none	Chen S. and Cheng L. and Chen T. and Cheng J. and Cheng R. and Cheng D.	A review of 2399 ears for postmyringotomy tube otorrhea	Otolaryngology - Head and Neck Surgery	Abstract only
none	Wang M.-C.	Ventilation tube insertions for pediatric otitis media with effusion: With adenoidectomy or not	Otolaryngology - Head and Neck Surgery	Abstract only
none	Russell C. and Black O. and Dutt D. and Ray A. and Devlin M. and Wynne D.	Are ventilation tubes (grommets) in cleft children truly associated with increased complication rates? Results of a nested case control study of cleft and non-cleft children	British Journal of Oral and Maxillofacial Surgery	Abstract only
none	Sidell D.R. and Hunter L. and Lin L. and Arjmand E.M.	Risk factors for hearing loss in the setting of pressure equalization tube placement in children	Otolaryngology - Head and Neck Surgery	Abstract only
none	Black O. and Dutt D. and Russell C. and Devlin M. and Ray A. and Wynne D.	Ventilation tubes in cleft children carry no higher risk of complication than their use in non cleft children: Results of a nested case control study	Clinical Otolaryngology	Abstract only
none	Diacova S. and Ababii I. and Maniuc M. and Danilov L. and Ababii P. and Diacova O. and McDonald T.J.	Modified surgery in children with persistent and recurrent otitis media	Archives of Disease in Childhood	Abstract only
none	Wolter N.E. and Dell S. and James A.L. and Campisi P.	Middle ear ventilation in children with primary ciliary dyskinesia	Otolaryngology - Head and Neck Surgery	Abstract only
5567839	J K Graham	Serous otitis media: complication of polyethylene tube insertion	Eye, ear, nose & throat monthly	Cohort, N < 50
12610892	Pulec J.L. and Deguine C.	Long-term ventilating tube with tympanosclerosis	Ear, Nose and Throat Journal	Cohort, N < 50
11011482	Pulec J.L. and Deguine C.	Long-term ventilating tube with tympanosclerosis	Ear, Nose and Throat Journal	Cohort, N < 50
13157738	Armstrong B.W.	A new treatment for chronic secretory otitis media	Archives of otolaryngology	Cohort, N < 50
10624048	Deguine C. and Pulec J.L.	Grommet ventilation myringostomy with cholesteatoma	Ear, Nose and Throat Journal	Cohort, N < 50
18357935	Abbarah T. and Abbarah M.A.	Migration of T-tubes to the middle ear	Ear, Nose and Throat Journal	Cohort, N < 50

10504021	Y Iino and Y Imamura and S Harigai and Y Tanaka	Efficacy of tympanostomy tube insertion for otitis media with effusion in children with Down syndrome	International journal of pediatric otorhinolaryngology	Cohort, N < 50
3218926	C C Lau and K K Loh and N Kunaratnam	Middle ear diseases in cleft palate patients in Singapore	Annals of the Academy of Medicine, Singapore	Cohort, N < 50
5778864	J H Per-Lee	Experiences with a "permanent" wide flange middle ear ventilation tube	The Laryngoscope	Cohort, N < 50
8551144	D P Martin-Hirsch and C J Woodhead and C E Vize	Long-term ventilation of the middle ear using a tympanotomy technique	The Journal of laryngology and otology	Cohort, N < 50
7818639	J G Gilbert	Swimming and grommets: a prospective survey	The New Zealand medical journal	Cohort, N < 50
17440366	Mohamed E Hassan and Sherif Askar	Does palatal muscle reconstruction affect the functional outcome of cleft palate surgery?	Plastic and reconstructive surgery	Cohort, N < 50
9041283	M N Orlin and S K Effgen and S D Handler	Effect of otitis media with effusion on gross motor ability in preschool-aged children: preliminary findings	Pediatrics	Cohort, N < 50
19251534	Mao-Che Wang and Chia-Yu Liu and An-Suey Shiao	Water penetration into middle ear through ventilation tubes in children while swimming	Journal of the Chinese Medical Association : JCMA	Cohort, N < 50
3418217	C Watson and K S Mangat	A comparison of audiometric performance and complications of T tubes and Shepard grommets	The Journal of laryngology and otology	Cohort, N < 50
512469	J Samuel and G Rosen and Y Vered	Use of middle ear ventilation tubes in recurrent acute otitis media	The Journal of laryngology and otology	Cohort, N < 50
2769837	D McRae and D J Gatland and R Youngs and J Cook	Aspiration of middle ear effusions prior to grommet insertion an etiological factor in tympanosclerosis	The Journal of otolaryngology	Cohort, N < 50
7619414	R W Force and M C Hart and S A Plummer and D A Powell and M C Nahata	Topical ciprofloxacin for otorrhea after tympanostomy tube placement	Archives of otolaryngology--head & neck surgery	Cohort, N < 50
3243014	T H Lesser and K R Williams and D W Skinner	Tympanosclerosis, grommets and shear stresses	Clinical otolaryngology and allied sciences	Cohort, N < 50
4855092	H L Wilson	The steel whisker tube in chronic secretory otitis media	Transactions - American Academy of Ophthalmology and Otolaryngology. American Academy of Ophthalmology and Otolaryngology	Cohort, N < 50
5550610	N Shah	Use of grommets in 'glue' ears	The Journal of laryngology and otology	Cohort, N < 50
6023618	W L Draper	Secretory otitis media in children: a study of 540 children	The Laryngoscope	Cohort, N < 50

1863436	H C Pillsbury and J H Grose and J W Hall	Otitis media with effusion in children. Binaural hearing before and after corrective surgery	Archives of otolaryngology-- head & neck surgery	Cohort, N < 50
8504893	M Selikowitz	Short-term efficacy of tympanostomy tubes for secretory otitis media in children with Down syndrome	Developmental medicine and child neurology	Cohort, N < 50
14568787	Joseph W Hall and John H Grose and Emily Buss and Madhu B Dev and Amelia F Drake and Harold C Pillsbury	The effect of otitis media with effusion on perceptual masking	Archives of otolaryngology-- head & neck surgery	Cohort, N < 50
7190178	Q Bailey	The Castelli membrane in the treatment of glue ear	The Journal of laryngology and otology	Cohort, N < 50
18072559	Wei Li and Wei Shang and Ai-hua Yu and Xiao-heng Zhang and Yu-xin Liu and Xiu-ming Wan and Mu-yun Jia and Ning-yi Li	[Early treatment of middle ear disease in cleft palate infants]	Hua xi kou qiang yi xue za zhi = Huaxi kouqiang yixue zazhi = West China journal of stomatology	Cohort, N < 50
11678951	{Medical Research Council Multicentre Otitis Media Study Group}	Surgery for persistent otitis media with effusion: generalizability of results from the UK trial (TARGET). Trial of Alternative Regimens in Glue Ear Treatment	Clinical otolaryngology and allied sciences	No extractable data
11434951	M M Rovers and G A Zielhuis and K Bennett and M Haggard	Generalisability of clinical trials in otitis media with effusion	International journal of pediatric otorhinolaryngology	No extractable data
12680834	{MRC Multicentre Otitis Media Study Group}	The role of ventilation tube status in the hearing levels in children managed for bilateral persistent otitis media with effusion	Clinical otolaryngology and allied sciences	No extractable data
12363423	A A Maheshwar and M A P Milling and M Kumar and M I Clayton and A Thomas	Use of hearing aids in the management of children with cleft palate	International journal of pediatric otorhinolaryngology	No extractable data
25677370	Joong Ho Ahn and Woo Seok Kang and Ji Heui Kim and Kyung S Koh and Tae Hyun Yoon	Critical reassessment of the probability of receiving additional ventilation tube insertion for recurrent otitis media with effusion in children with a cleft palate	Acta oto-laryngologica	No extractable data
3818186	H Hafner and I Anteby and H Pratt and M Goldsher and R Shenhav and H Z Joachims	Auditory brainstem evoked potentials in evaluating the efficacy of surgical ventilation of the middle ear	International journal of pediatric otorhinolaryngology	No extractable data
10542923	J D Hern and D A Jonathan	Insertion of ventilation tubes: does the site matter?	Clinical otolaryngology and allied sciences	No extractable data

8741962	L L Hunter and R H Margolis and J R Rykken and C T Le and K A Daly and G S Giebink	High frequency hearing loss associated with otitis media	Ear and hearing	No extractable data
3818185	I Anteby and H Hafner and H Pratt and N Uri	Auditory brainstem evoked potentials in evaluating the central effects of middle ear effusion	International journal of pediatric otorhinolaryngology	No extractable data
6778358	B Hussl and K Welzl-Mueller	Secretory otitis media and mastoid pneumatization	The Annals of otology, rhinology & laryngology. Supplement Family practice	No extractable data
24243868	Christina T Ryborg and Jens Søndergaard and Jørgen Lous and Anders Munck and Pia V Larsen and Janus L Thomsen	Quality of life in children with otitis media--a cohort study		No extractable data
11074114	Y Rakover and K Keywan and G Rosen	Comparison of the incidence of cholesteatoma surgery before and after using ventilation tubes for secretory otitis media	International journal of pediatric otorhinolaryngology	No extractable data
5795401	Paradise J.L. and Bluestone C.D. and Felder H.	The universality of otitis media in 50 infants with cleft palate	Pediatrics	No extractable data
22531243	Van Dongen T.M.A. and Schilder A.G.M. and Manders L.A. and Van Der Veen E.L. and Van Der Heijden G.J.M.G.	Good agreement between parents and physician in the assessment of ear discharge in children	Pediatric Infectious Disease Journal	No extractable data
18685496	{MRC Multicentre Otitis Media Study Group}	An extension of the Jerger classification of tympanograms for ventilation tube patency--specification and evaluation of equivalent ear-canal volume criteria	Ear and hearing	No extractable data
23917659	Leticia Reis Borges and Jorge Rizzato Paschoal and Maria Francisca Colella-Santos	(Central) auditory processing: the impact of otitis media	Clinics (Sa~o Paulo, Brazil)	No harms reported
none	Donaldson J.A.	The role of artificial(bullet) eustaciiian tube in cleft palate patients	Cleft Palate Journal	No harms reported
12622537	Mark Boston and Joe McCook and Bonnie Burke and Craig Derkey	Incidence of and risk factors for additional tympanostomy tube insertion in children	Archives of otolaryngology--head & neck surgery	No harms reported
8877207	A R Maw and R Bawden and L O'Keefe and P Gurr	Does the type of middle ear aspirate have any prognostic significance in otitis media with effusion in children?	Clinical otolaryngology and allied sciences	No harms reported
8260856	T C Theoharides and S S Manolidis and H Vliagoftis and L S Manolidis	Treatment of secretory otitis media with local instillation of hydroxyzine	International archives of allergy and immunology	No harms reported

8026089	A R Maw and R Bawden	Factors affecting resolution of otitis media with effusion in children	Clinical otolaryngology and allied sciences	No harms reported
24983459	Mao-Che Wang and Ying-Piao Wang and Chia-Huei Chu and Tzong-Yang Tu and An-Suey Shiao and Pesus Chou	The protective effect of adenoidectomy on pediatric tympanostomy tube re-insertions: a population-based birth cohort study	PloS one	No harms reported
21106257	Richard M Rosenfeld and David W Jang and Konstantin Tarashansky	Tympanostomy tube outcomes in children at-risk and not at-risk for developmental delays	International journal of pediatric otorhinolaryngology	No harms reported
22183901	Nathan S Alexander and Brian D Kulbersh and C Hope Heath and Renee A Desmond and Eric Caron and Audie L Woolley and Jimmy Scott Hill and W Peyton Shirley and Brian J Wiatrak	MRSA and non-MRSA otorrhea in children: a comparative study of clinical course	Archives of otolaryngology--head & neck surgery	No harms reported
12117333	Michele Richards and Carla Giannoni	Quality-of-life outcomes after surgical intervention for otitis media	Archives of otolaryngology--head & neck surgery	No harms reported
7218998	B F Jaffe	Are water and tympanotomy tubes compatible?	The Laryngoscope	No harms reported
1787379	A Golz and S T Westerman and L M Gilbert and H Z Joachims and A Netzer	Effect of middle ear effusion on the vestibular labyrinth	The Journal of laryngology and otology	No harms reported
3974389	B F Lounsbury	Swimming unprotected with long-shafted middle ear ventilation tubes	The Laryngoscope	No harms reported
9596366	A Golz and B Angel-Yeger and S Parush	Evaluation of balance disturbances in children with middle ear effusion	International journal of pediatric otorhinolaryngology	No harms reported
12439177	Rahmi Kiliç and Mustafa A Safak and Ali Ozdek and Hakan Göçmen and Dilek Kiliç and Erdal Samim	Effect of 23 valent pneumococcal polysaccharide and Haemophilus influenza conjugated vaccines on the clinical course of otitis media with effusion	The Laryngoscope	No harms reported
17645949	Yan Chow and David A M Wabnitz and John Ling	Quality of life outcomes after ventilating tube insertion for otitis media in an Australian population	International journal of pediatric otorhinolaryngology	No harms reported
20504840	Petri S Mattila and Sari Hammarén-Malmi and Harri Saxen and Tarja Kaijalainen and Helena Käyhty and Jussi Tarkkanen	Adenoidectomy and nasopharyngeal carriage of Streptococcus pneumoniae in young children	Archives of disease in childhood	No harms reported
7193427	H H Elverland and I W Mair and O K Haugeto and K E Schrøder	Influence of adenoid hypertrophy on secretory otitis media	The Annals of otology, rhinology, and laryngology	No harms reported

6539321	O G Neumann and R Laszig	[Diagnosis and therapy of seromucous otitis. Experience with 2766 operations on children]	HNO	No harms reported
none	Raja H. and Williams J. and Tzifa K.	Audiology following up grommets can improve efficiency and finances for ENT	Clinical Otolaryngology	No outcomes of interest
17043261	Erwin L van der Veen and Anne G M Schilder and Niels van Heerbeek and Monique Verhoeff and Gerhard A Zielhuis and Maroeska M Rovers	Predictors of chronic suppurative otitis media in children	Archives of otolaryngology--head & neck surgery	No outcomes of interest
2563465	G A Zielhuis and G H Rach and P van den Broek	Screening for otitis media with effusion in preschool children	Lancet (London, England)	No outcomes of interest
1571119	G S Giebink and K Daly and D J Buran and M Satz and T Ayre	Predictors for postoperative otorrhea following tympanostomy tube insertion	Archives of otolaryngology--head & neck surgery	No outcomes of interest
14643475	Joseph Dohar	Microbiology of otorrhea in children with tympanostomy tubes: implications for therapy	International journal of pediatric otorhinolaryngology	No outcomes of interest
26454528	P Niemi and J Numminen and M Rautiainen and M Helminen and H Vinkka-Puhakka and T Peltomäki	The effect of adenoidectomy on occlusal development and nasal cavity volume in children with recurrent middle ear infection	International journal of pediatric otorhinolaryngology	No outcomes of interest
19131420	P S Mattila and S Hammarén-Malmi and A S Pelkonen and L P Malmberg and M J Mäkelä and H Saxen and J Tarkkanen	Effect of adenoidectomy on respiratory function: a randomised prospective study	Archives of disease in childhood	No outcomes of interest
17403263	S Sood and A Waddell	Accurate consent for insertion and later removal of grommets	The Journal of laryngology and otology	No outcomes of interest
22835927	Petri S Mattila and Sari Hammarén-Malmi and Harri Saxen and Tarja Kaijalainen and Helena Käyhty and Jussi Tarkkanen	Adenoidectomy in young children and serum IgG antibodies to pneumococcal surface protein A and choline binding protein A	International journal of pediatric otorhinolaryngology	No outcomes of interest
3201954	I Augustsson and C Nilsson and P Neander	Do we treat "the right" children with secretory otitis media at the ENT clinic?	Acta oto-laryngologica. Supplementum	No outcomes of interest
16172353	Brechtje de Beer and Ad Snik and Anne G M Schilder and Kees Graamans and Gerhard A Zielhuis	The effect of otitis media in childhood on the development of middle ear admittance on reaching adulthood	Archives of otolaryngology--head & neck surgery	No outcomes of interest
1479274	M A Salam and C Wengraf	Glue under pressure: a bad prognostic sign for recurrence of otitis media with effusion	The Journal of laryngology and otology	No outcomes of interest

23379112	Min Huang and Sijun Zhao and Yun Li and Xiangyue Peng and Yuting Kuang and Songliang Long	[The effect of tympanostomy tube surgery in cleft palate children with secretory otitis media]	Lin chuang er bi yan hou tou jing wai ke za zhi = Journal of clinical otorhinolaryngology, head, and neck surgery	No outcomes of interest
3713407	G A Gates and C Avery and T J Prihoda and G R Holt	Post-tympanostomy otorrhea	The Laryngoscope	No outcomes of interest
none	Poole M.D.	Bacterial resistance to quinolone otic drops is nearly zero	Ear, Nose and Throat Journal	No primary data
6974210	L J Hall	Chronic serous otitis media	The Journal of the Kentucky Medical Association	No primary data
8656164	A Adelman	Water precautions in children with tympanostomy tubes	The Journal of family practice	No primary data
6357648	T Lildholdt	Secretory otitis media. The significance of negative middle ear pressure and the results of a controlled study of ventilation tubes	Danish medical bulletin	No primary data
11509152	M B Stephens	Does delaying placement of tympanostomy tubes have an adverse effect on developmental outcomes in children with persistent middle ear effusions?	The Journal of family practice	No primary data
1110316	L W Pratt	The use of equalization tubes in nonsuppurative otitis media	The Journal of the Maine Medical Association	No primary data
8461735	A F Bisset	Persistent glue ear in children	BMJ (Clinical research ed.)	No primary data
16299942	NA	Early tympanostomy tubes do not improve outcomes after 3+ years	The Journal of family practice	No primary data
7017311	D E Gebhart	Tympanostomy tubes in the otitis media prone child	The Laryngoscope	No primary data
24438691	Chantal W B Boonacker and Maroeska M Rovers and George G Browning and Arno W Hoes and Anne G M Schilder and Martin J Burton	Adenoidectomy with or without grommets for children with otitis media: an individual patient data meta-analysis	Health technology assessment (Winchester, England)	No primary data
15851429	M M Rovers and N Black and G G Browning and R Maw and G A Zielhuis and M P Haggard	Grommets in otitis media with effusion: an individual patient data meta-analysis	Archives of disease in childhood	No primary data
8404550	C Deguine and J L Pulec	Long-term ventilation myringostomy	Ear, nose, & throat journal	No primary data
567665	M E Alberts	Ventilation of glue ears	Journal of the Iowa Medical Society	No primary data
8482269	M D Poole	Treatment of otorrhea associated with tubes or perforations	Ear, nose, & throat journal	No primary data

24524194	Chin-Lung Kuo and Yuan-Heng Tsao and An-Suey Shiao	Critical reassessment of the probability of receiving additional ventilation tube insertion for recurrent otitis media with effusion in children with cleft palate	Acta oto-laryngologica	No primary data
880099	D W Johnson and R H Mathog and R H Maisel	Tympanostomy tube protection with ear plugs	Archives of otolaryngology (Chicago, Ill. : 1960)	No primary data
3743473	I J Moore and G F Moore and A J Yonkers	Otitis media in the cleft palate patient	Ear, nose, & throat journal	No primary data
1009868	B K Devgan	Spoon-bobbin drain tube	Ear, nose, & throat journal	No primary data
11115295	C Giannoni	Swimming with tympanostomy tubes	Archives of otolaryngology-- head & neck surgery	No primary data
3522165	NA	The surgical management of glue ear	Drug and therapeutics bulletin	No primary data
853006	R Reck	A rare complication of use of the middle ear ventilation tube (PVC)	HNO	No primary data
17537888	Morten Lindbaek	Prompt insertion of tympanostomy tubes in infants and toddlers with persistent middle ear effusion did not improve developmental outcomes at 9-11 years of age	Evidence-based medicine	No primary data
6778337	J L Paradise and C D Bluestone and K D Rogers and F H Taylor	Efficacy of adenoidectomy in recurrent otitis media. Historical overview and preliminary results from a randomized, controlled trial	The Annals of otology, rhinology & laryngology. Supplement	No primary data
8494594	P Federspil	[Treatment of "suppurating ear" with intact middle ear tubes]	Laryngo- rhino- otologie	No primary data
11115297	Brodsky L.	Swimming with tympanostomy tubes: The controversy continues	Archives of Otolaryngology - Head and Neck Surgery	No primary data
none	Dohar J.E.	Are topical quinolones safe for middle ear use in children?	Ear, Nose and Throat Journal	No primary data
none	Rovers M.M. and Krabbe P.F. and Straatman H.	Ventilation tubes did not improve quality of life in persistent otitis media with effusion	Evidence-Based Medicine	No primary data
9253394	S M Marcus	Assessing non-consent bias with parallel randomized and nonrandomized clinical trials	Journal of clinical epidemiology	No TT arm
25873182	Mirjana Kostic and Ksenija Ribaric Jankes and Robert Trotic and Mihael Ries and Branka Ledic and Vladimir Bedekovic	Clinical and audiological findings in children with acute otitis media	Acta oto-laryngologica	No TT arm
3701198	E Vartiainen and J Kärjä and S Karjalainen	Surgery of chronic otitis media in young patients	The Journal of laryngology and otology	No TT arm

962698	M C Gydé	When the weeping stopped: an otologist views otorrhea and gentamicin	Archives of otolaryngology (Chicago, Ill. : 1960)	No TT arm
14551787	Elbieta Hassmann and Boena Skotnicka and Maria Baczek and Malgorzata Piszcz	Laser myringotomy in otitis media with effusion: long-term follow-up	European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery	No TT arm
25274185	A Qureishi and G Garas and A Mallick and D Parker	The psychosocial impact of hearing aids in children with otitis media with effusion	The Journal of laryngology and otology	No TT arm
21362577	Chang Ho Lee and Chan Kee Yoo and Jong Eui Hong and Hong Joong Kim and Dae Geun Lim and Kwang Joong Kim	Resolved effusion on myringotomy: a study of dry tap without general anesthesia	International journal of pediatric otorhinolaryngology	No TT arm
4470582	I S Thomson	Exudative otitis media, grommets and cholesteatoma	The Journal of laryngology and otology	Not population of interest
20058316	Katrina Spilsbury and Ian Miller and James B Semmens and Francis J Lannigan	Factors associated with developing cholesteatoma: a study of 45,980 children with middle ear disease	The Laryngoscope	Not population of interest
19091429	Yun Shan Phua and Lesley J Salkeld and Tristan M B de Chelain	Middle ear disease in children with cleft palate: protocols for management	International journal of pediatric otorhinolaryngology	Not population of interest
7098686	H Heumann and E Steinbach and R Seuffer	[A clinical and experimental study on precious metal ventilation tubes (author's transl)]	Laryngologie, Rhinologie, Otologie	Not population of interest
6380828	C H Bulman and S J Brook and M G Berry	A prospective randomized trial of adenoidectomy vs grommet insertion in the treatment of glue ear	Clinical otolaryngology and allied sciences	Per ear assignment
6598263	T Lildholdt	Consequences of ventilation tube treatment	Acta oto-laryngologica. Supplementum	Per ear assignment
2037414	M J Cunningham and E H Harley	Preventing perioperative obstruction of tympanostomy tubes: a prospective trial of a simple method	International journal of pediatric otorhinolaryngology	Per ear assignment
5070299	D Kilby and S H Richards and G Hart	Grommets and glue ears: two-year results	The Journal of laryngology and otology	Per ear assignment
3389234	A R Maw	Tonsils and adenoids. Their relation to secretory otitis media	Advances in oto-rhino-laryngology	Per ear assignment
9199524	M Gaihede and T Lildholdt and J Lundling	Sequelae of secretory otitis media: changes in middle ear biomechanics	Acta oto-laryngologica	Per ear assignment
2394020	A J Parker and A R Maw and J E Powell	Intra-tympanic membrane bleeding after grommet insertion and tympanosclerosis	Clinical otolaryngology and allied sciences	Per ear assignment

3524910	N Black and J Crowther and A Freeland	The effectiveness of adenoidectomy in the treatment of glue ear: a randomized controlled trial	Clinical otolaryngology and allied sciences	Per ear assignment
21072756	Paul Hong and Neil Smith and Liane B Johnson and Gerard Corsten	A randomized double-blind controlled trial of phosphorylcholine-coated tympanostomy tube versus standard tympanostomy tube in children with recurrent acute and chronic otitis media	The Laryngoscope	Per ear assignment
650647	M J Brown and S H Richards and A G Ambegaokar	Grommets and glue ear: a five-year follow up of a controlled trial	Journal of the Royal Society of Medicine	Per ear assignment
2196954	N A Black and C F Sanderson and A P Freeland and M P Vessey	A randomised controlled trial of surgery for glue ear	BMJ (Clinical research ed.)	Per ear assignment
1919311	A R Maw	Development of tympanosclerosis in children with otitis media with effusion and ventilation tubes	The Journal of laryngology and otology	Per ear assignment
3348665	H R Grant and R E Quiney and D M Mercer and S Lodge	Cleft palate and glue ear	Archives of disease in childhood	Per ear assignment
3243009	D W Skinner and T H Lesser and S H Richards	A 15 year follow-up of a controlled trial of the use of grommets in glue ear	Clinical otolaryngology and allied sciences	Per ear assignment
16368152	Uneri C. and Baglam T. and Yazici M.	The effect of Vitamin E treatment on the development of myringosclerosis after ventilation tube insertion	International Journal of Pediatric Otorhinolaryngology	Per ear assignment
10912691	Banerjee A.R. and Jennings C. and Marshall J.N. and Narula A.A.	The effect of topical adrenaline on the development of myringosclerosis after tympanostomy tube insertion	American Journal of Otology	Per ear assignment
4925501	Richards S.H.	Grommets and glue ears: A clinical trial	J.Laryng	Per ear assignment
2872514	A R Maw and F Herod	Otoscopic, impedance, and audiometric findings in glue ear treated by adenoidectomy and tonsillectomy. A prospective randomised study	Lancet (London, England)	Per ear assignment
12567079	Ron B Mitchell and Ellen Call and James Kelly	Ear, nose and throat disorders in children with Down syndrome	The Laryngoscope	Retrospective cohort, N < 1000
1451676	S S Hussain	Extrusion rate of Shah and Shepard ventilation tubes in children	Ear, nose, & throat journal	Retrospective cohort, N < 1000
16822553	Fatma Homood Al Anazy	Iatrogenic cholesteatoma in children with OME in a training program	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000

12707661	M Tayyar Kalcioğlu and Yasar Cokkeser and Ahmet Kizilay and Orhan Ozturan	Follow-up of 366 ears after tympanostomy tube insertion: why is it draining?	Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery	Retrospective cohort, N < 1000
17970145	Svetlana Diacova and Thomas J McDonald	A comparison of outcomes following tympanostomy tube placement or conservative measures for management of otitis media with effusion	Ear, nose, & throat journal	Retrospective cohort, N < 1000
15373873	D S Kim and P L A Moore and T J Rockley	Long-term Paparella II grommet use in the management of persistent childhood otitis media: a 5-year follow-up study	Clinical otolaryngology and allied sciences	Retrospective cohort, N < 1000
6890608	W M Luxford and J L Sheehy	Myringotomy and ventilation tubes: a report of 1,568 ears	The Laryngoscope	Retrospective cohort, N < 1000
22518157	Bilal Gani and A J Kinshuck and R Sharma	A review of hearing loss in cleft palate patients	International journal of otolaryngology	Retrospective cohort, N < 1000
7242199	J H Per-Lee	Long-term middle ear ventilation	The Laryngoscope	Retrospective cohort, N < 1000
8436454	K S Mangat and G A Morrison and T M Ganniwalla	T-tubes: a retrospective review of 1274 insertions over a 4-year period	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
6874239	J F Sederberg-Olsen and A E Sederberg-Olsen and A M Jensen	The prognostic significance of the air volume in the middle ear for the tendency to recurrence of secretory middle ear condition	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
3835916	Y Kawasaki and Y Sakamoto and Y Honmura and T Tatehara and K Miyagawa and Y Urao and J Kanzaki	Long-term results of ventilation tube for otitis media with effusion in children	Auris, nasus, larynx	Retrospective cohort, N < 1000
9118577	D Strachan and G Hope and M Hussain	Long-term follow-up of children inserted with T-tubes as a primary procedure for otitis media with effusion	Clinical otolaryngology and allied sciences	Retrospective cohort, N < 1000
8470547	E Manders and J Tyberghein	The effects of ventilation tube placement on hearing, speech, language, cognition and behaviour	Acta oto-rhino-laryngologica Belgica	Retrospective cohort, N < 1000
4809194	Paradise J.L. and Bluestone C.D.	Early treatment of the universal otitis media of infants with cleft palate	Pediatrics	Retrospective cohort, N < 1000
none	Kowata I. and Kobayashi S. and Onodera A.	Follow-up study of secretory otitis media in children	Otologia Fukuoka	Retrospective cohort, N < 1000
none	Ichihara T. and Haginomori S.-I. and Mori A. and Kanazawa A. and Nishikado A. and Kawata R.	Ventilation tube treatment in children with otitis media with effusion	Otolaryngology - Head and Neck Surgery	Retrospective cohort, N < 1000

none	Gristwood R.	Management of the draining ventilation tube in secretory otitis media	Australian Journal of Otolaryngology	Retrospective cohort, N < 1000
none	Meghji S. and Rea P.	Follow-up audit for grommets for persistent otitis media with effusion: Are we follow nice guidelines?	International Journal of Surgery	Retrospective cohort, N < 1000
21846926	Inessa Fishman and Kevin J Sykes and Rebecca Horvat and Rangaraj Selvarangan and Jason Newland and Julie L Wei	Demographics and microbiology of otorrhea through patent tubes failing ototopical and/or oral antibiotic therapy	Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery	Retrospective cohort, N < 1000
9119591	T Saito and E Iwaki and Y Kohno and T Ohtsubo and I Noda and S Mori and T Yamamoto and Y Shibamori and H Saito	Prevention of persistent ear drum perforation after long-term ventilation tube treatment for otitis media with effusion in children	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
16500457	Frank Hill	The Triune, a new silicone tympanostomy tube	Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery	Retrospective cohort, N < 1000
16230588	James M Coticchia and Joseph E Dohar	Methicillin-resistant Staphylococcus aureus otorrhea after tympanostomy tube placement	Archives of otolaryngology--head & neck surgery	Retrospective cohort, N < 1000
3927225	M R Klingensmith and M Strauss and G H Conner	A comparison of retention and complication rates of large-bore (Paparella II) and small-bore middle ear ventilating tubes	Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery	Retrospective cohort, N < 1000
3835921	N Yanagihara and T Yagi	Limitation of long term ventilation tube: in view of complications and hearing restoration	Auris, nasus, larynx	Retrospective cohort, N < 1000
26115935	Mallory B O'Niel and Laura D Cassidy and T Roxanne Link and Joseph E Kerschner	Tracking tympanostomy tube outcomes in pediatric patients with otitis media using an electronic database	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
3835931	M Sakai and A Shinkawa and S Saito and H Miyake	Late results of hearing in children treated with tympanostomy tube	Auris, nasus, larynx	Retrospective cohort, N < 1000
4843116	L A Hughes and F R Warder and W R Hudson	Complications of tympanostomy tubes	Archives of otolaryngology (Chicago, Ill. : 1960)	Retrospective cohort, N < 1000
11564294	Y Talmon and H Gadban and A Samet and P Gilbey and V Letichevsky	Medium-term middle ear ventilation with self-manufactured polyethylene T-tubes for the treatment of children with middle ear effusion	The Journal of laryngology and otology	Retrospective cohort, N < 1000

16813031	Stanley Mui and Barry M Rasgon and Raymond L Hilsinger and Brent Lewis and Gretchen Lactao	Tympanostomy tubes for otitis media: quality-of-life improvement for children and parents	Ear, nose, & throat journal	Retrospective cohort, N < 1000
9853658	E Iwaki and T Saito and G Tsuda and C Sugimoto and Y Kimura and N Takahashi and K Fujita and H Sunaga and H Saito	Timing for removal of tympanic ventilation tube in children	Auris, nasus, larynx	Retrospective cohort, N < 1000
6685748	M Ben-Ami and G Rosen and T Shlezinger and S Konack and M Ben-Ami	Otitis media with effusion--complications after treatment	The Journal of laryngology and otology	Retrospective cohort, N < 1000
6778333	W Draf and P Schulz	Insertion of ventilation tubes into the medical ear: results and complications. A seven-year review	The Annals of otology, rhinology & laryngology. Supplement	Retrospective cohort, N < 1000
7192378	J J Holt and S G Harner	Effects of large-bore middle ear ventilation tubes	Otolaryngology and head and neck surgery	Retrospective cohort, N < 1000
11738691	Oren Friedman and Ellen S Deutsch and James S Reilly and Steven P Cook	The feasibility of office-based laser-assisted tympanic membrane fenestration with tympanostomy tube insertion: the duPont Hospital experience	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
8588632	A G Schilder and G A Zielhuis and M P Haggard and P van den Broek	Long-term effects of otitis media with effusion: otomicroscopic findings	The American journal of otology	Retrospective cohort, N < 1000
3915206	T J Balkany and I K Arenberg and R L Steenerson	Middle ear irrigation during insertion of ventilation tubes	Auris, nasus, larynx	Retrospective cohort, N < 1000
15829063	Marie Ryding and Peter White and Olof Kalm	Course and long-term outcome of 'refractory' secretory otitis media	The Journal of laryngology and otology	Retrospective cohort, N < 1000
12472518	P Sheahan and A W Blayney and J N Sheahan and M J Earley	Sequelae of otitis media with effusion among children with cleft lip and/or cleft palate	Clinical otolaryngology and allied sciences	Retrospective cohort, N < 1000
26043589	Vladimir Djordjevic and Bojana Bukurov and Nenad Arsovic and Snežana Ješić and Jovica Milovanovic and Vladimir Nešić	Long term complications of ventilation tube insertion in children with otitis media with effusion	Vojnosanitetski pregled	Retrospective cohort, N < 1000
3835919	M Suzuki and K Kodera	Long term follow-up of secretory otitis media in children: the effects of adenotonsillectomy with insertion of a ventilation tube	Auris, nasus, larynx	Retrospective cohort, N < 1000
3189124	L A Hughes and D Wight	Tympanostomy tubes: long-term effects	American family physician	Retrospective cohort, N < 1000

969088	D G Pappas	Triflanged tube for chronic serous otitis media	Transactions. Section on Otolaryngology. American Academy of Ophthalmology and Otolaryngology	Retrospective cohort, N < 1000
18225626	Arthur H Allen	Is i.v. access necessary for myringotomy with tubes?	Ear, nose, & throat journal	Retrospective cohort, N < 1000
5058477	S R Mawson and P Fagan	Tympanic effusions in children. Long-term results of treatment by myringotomy, aspiration and indwelling tubes (grommets)	The Journal of laryngology and otology	Retrospective cohort, N < 1000
3427799	R W Slack and J M Gardner and C Chatfield	Otorrhoea in children with middle ear ventilation tubes: a comparison of different types of tubes	Clinical otolaryngology and allied sciences	Retrospective cohort, N < 1000
6085804	P Arcand and P Gauthier and G Bilodeau and G Chapados and A Abela and R Desjardins and P P Gagnon and A J Guerguerian	Post-myringotomy care: a prospective study	The Journal of otolaryngology	Retrospective cohort, N < 1000
4041175	V Svane-Knudsen and T Lildholdt	Sequelae of ventilation tubes following tonsillectomy	Archives of oto-rhino-laryngology	Retrospective cohort, N < 1000
1011326	T Palva and E Kokko	Middle ear effusions -- complications of disease and treatment	The Journal of otolaryngology	Retrospective cohort, N < 1000
2037413	B H Matt and R P Miller and R M Meyers and J M Campbell and R T Cotton	Incidence of perforation with Goode T-tube	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
25554572	Axel Håkansson and Rut Florentzson and Lisa Tuomi and Caterina Finizia	Transmyringeal ventilation tube treatment in children: hearing outcome after 10 years	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
2594453	M E Pichichero and L R Berghash and A S Hengerer	Anatomic and audiologic sequelae after tympanostomy tube insertion or prolonged antibiotic therapy for otitis media	The Pediatric infectious disease journal	Retrospective cohort, N < 1000
3698323	J W Curley	Grommet insertion: some basic questions answered	Clinical otolaryngology and allied sciences	Retrospective cohort, N < 1000
10994430	G D Smyth and C C Patterson and S Hall	Tympanostomy tubes: do they significantly benefit the patient?	Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery	Retrospective cohort, N < 1000
2589073	J F Sederberg-Olsen and A E Sederberg-Olsen and A M Jensen	Late results of treatment with ventilation tubes for secretory otitis media in ENT practice	Acta oto-laryngologica	Retrospective cohort, N < 1000

24735607	Hye Ran Hong and Tae Su Kim and Jong Woo Chung	Long-term follow-up of otitis media with effusion in children: comparisons between a ventilation tube group and a non-ventilation tube group	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
6682411	G Pestalozza and G Cusmano and E Tessitore and A Bonelli	Transtympanic drains in the treatment of serous otitis in children; anatomical versus functional long term results	International journal of pediatric otorhinolaryngology	Retrospective cohort, N < 1000
20359098	Qi Gui and Zhinan Wang and Ping Chen	[Retaining time of tympanic ventilation tube and aural complications]	Lin chuang er bi yan hou tou jing wai ke za zhi = Journal of clinical otorhinolaryngology, head, and neck surgery	Retrospective cohort, N < 1000
955999	A E Kortekangas and E Virolainen	[Experiences with polyethylene ventilation tubes in children with recurrent middle ear inflammation (author's transl)]	HNO	Retrospective cohort, N < 1000
2631910	M T Dueñas Polo and J L Pardal Refoyo and A Ramos Macías and F Ruiz Martín and A Cañizo Alvarez	[Transtympanic ventilation tubes and serous otitis media. Study of 100 cases]	Acta otorrinolaringolo'gica espan~ola	Retrospective cohort, N < 1000
1867910	J Vallés Fontanet and X Perramón Montoliu	[The clinical evolution of transtympanic ventilation tubes in serous otitis. A study of 123 cases]	Acta otorrinolaringolo'gica espan~ola	Retrospective cohort, N < 1000
6538920	G Geyer	[The seromucous tympanum]	Laryngologie, Rhinologie, Otologie	Retrospective cohort, N < 1000
7873230	J A Jiménez Antolín and O Lasso Luis and E Muñoz Platón and M Rodríguez Francos and E Galdeano Granda	[Myringotomy and transtympanic ventilation tubes in secretory otitis media. A study of 108 children]	Acta otorrinolaringolo'gica espan~ola	Retrospective cohort, N < 1000
15583925	V Gudziol and W J Mann	[Otological findings in adults with isolated cleft palate or cleft lip, jaw, and palate]	Mund-, Kiefer- und Gesichtschirurgie : MKG	Retrospective cohort, N < 1000
23002647	Ningbo Wang and Enqin Zhang and Chunbo Lan and Wenwen Xiao and Jiabin Liu	[Clinical research of T tube implantation on children with chronic otitis media]	Lin chuang er bi yan hou tou jing wai ke za zhi = Journal of clinical otorhinolaryngology, head, and neck surgery	Retrospective cohort, N < 1000
3618986	P Canals Ruiz and J L Peris Beaufills and F López Catalá and C Morera Pérez	[Secretory otitis media: surgical treatment and results]	Anales otorrinolaringolo'gicos ibero-americanos	Retrospective cohort, N < 1000
8991399	J L Lacosta and M Zabaleta and I Erdozain	[The evolution of otitis media with effusion treated by transtympanic drainage]	Acta otorrinolaringolo'gica espan~ola	Retrospective cohort, N < 1000
1874637	J Mertens and B Schwenk	[Cholesteatoma and chronic tubal middle ear infection in children. A 10 year overview]	HNO	Retrospective cohort, N < 1000
21777983	David M Gleinser and Hilda H Kriel and Shraddha Mukerji	The relationship between repeat tympanostomy tube insertion and adenoidectomy	International journal of pediatric otorhinolaryngology	No outcomes of interest

10406313	O C Ilicali and N Keles and K Deger and I Savas	Relationship of passive cigarette smoking to otitis media	Archives of otolaryngology--head & neck surgery	No outcomes of interest
7550814	D A Clements and L Langdon and C Bland and E Walter	Influenza A vaccine decreases the incidence of otitis media in 6- to 30-month-old children in day care	Archives of pediatrics & adolescent medicine	No outcomes of interest
8336923	F Debruyne and M Degroote	One-year follow-up after tympanostomy tube insertion for recurrent acute otitis media	ORL; journal for oto-rhino-laryngology and its related specialties	Retrieved in abstract only
7642987	H L Tay and R P Mills	Tympanic membrane atelectasis in childhood otitis media with effusion	The Journal of laryngology and otology	Retrieved in abstract only
8928639	C Stenström and L Ingvarsson	Late effects on ear disease in otitis-prone children: a long-term follow-up study	Acta oto-laryngologica	Retrieved in abstract only
5249846	M S Robertson	Chronic secretory otitis media: treatment with trans-tympanic indwelling polythene tubes	The New Zealand medical journal	Retrieved in abstract only
26443477	Richard M Rosenfeld and Krishna Sury and Christopher Mascarinas	Office Insertion of Tympanostomy Tubes without Anesthesia in Young Children	Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery	Retrieved in abstract only
9288214	H Valtonen and Y Qvarnberg and H Puhakka and J Nuutinen	Early post-tympanostomy otorrhea in children under 17 months of age	Acta oto-laryngologica	Retrieved in abstract only
5074564	N Stangeland	[Otosalpingitis--treatment with a polyethylene tube in the ear drum]	Tidsskrift for den Norske lægeforening : tidsskrift for praktisk medicin, ny række HNO	Retrieved in abstract only
7462026	J E Hug and C R Pfaltz	[Short- or long-term middle ear ventilation? (author's transl)]		Retrieved in abstract only
4636406	C von Sydow	[Middle-ear drainage in otosalpingitis]	La"kartidningen	Retrieved in abstract only
2845850	M François and O Laccourreye and J N Margo and V Herman and P Narcy	[Short-term complications of transtympanic aerators]	Annales d'oto-laryngologie et de chirurgie cervico faciale : bulletin de la Socie'te' d'oto-laryngologie des ho^pitaux de Paris	Retrieved in abstract only
4079654	V Cerkez	[Treatment of secretory otitis: medical or surgical therapy?]	Lijecnicki vjesnik	Retrieved in abstract only
3784716	K Konr dsson and U Ortegren	[Transmyringeal ventilation tubes: postoperative restrictions and early complications]	La"kartidningen	Retrieved in abstract only
16480003	Takeshi Yagi and Ken Hayashi and Hisayoshi Shikii and Yuko Miyamoto and Makoto Oda and Atsushi Shinkawa	[Effect of volume reduction surgery by radiofrequency for enlarged adenoid causing recurrent otitis media with effusion]	Nihon Jibiinkoka Gakkai kaiho	Retrieved in abstract only
1416480	A Clarós	[Otitis media. Surgical treatment]	Anales espan~oles de pediatri'a	Retrieved in abstract only
10853347	M Fücsek and M Gábríel	[Long-term results of tube insertion in treating otitis media with effusion]	Orvosi hetilap	Retrieved in abstract only

14823225	{CHAUVET}	[Consideration on the therapy of tubal otorrhea]	Gazette me'dicale de France	Retrieved in abstract only
3604104	K Haralampiev and B Kitanoski and B Ristic and M Jacimovic	[Surgical treatment of chronic secretory otitis using aeration-drainage tubes]	Vojnosanitetski pregled	Retrieved in abstract only
26281253	Sen Li and Hong Zhang and Yun Wei and Xilei Zhang and Yingru Wu and Jiang Qian and Liang Shen and Zhengjian Zhang	[Clinical comparative study on the treatment characteristics of secretory otitis media between cleft and non-cleft palate patients]	Hua xi kou qiang yi xue za zhi = Huaxi kouqiang yixue zazhi = West China journal of stomatology	Retrieved in abstract only
12107957	Jørgen Lous and Maj-Britt Glenn Lauritsen	[Inserted tympanostomy tube in prolonged secretory otitis has no effect on language development]	Ugeskrift for laeger	Retrieved in abstract only
1161091	R J van der Wal	[Swimming with perforated tympanic membrane?]	Nederlands tijdschrift voor geneeskunde	Retrieved in abstract only
7569388	J P Dachy and I Evrard	[Goode's transtympanic drains. Indications and complications]	Revue de laryngologie - otologie - rhinologie	Retrieved in abstract only
6576790	N Fernández-Blasini	[Tonsils, adenoids and related problems: use and abuse of ventilation tubes]	Boletín de la Asociación Médica de Puerto Rico	Retrieved in abstract only
8191069	F Devars and L Traissac	[Seromucous otitis. Treatment and long-term development]	Revue de laryngologie - otologie - rhinologie	Retrieved in abstract only
26281252	Wenrong Jiang and Tao He and Qian Zheng and Wei Zheng and Bing Shi and Chao Yang and Chenghao Li	[Integrated assessment of middle ear dysfunction in cleft palate patients and optimization of therapeutic schedule]	Hua xi kou qiang yi xue za zhi = Huaxi kouqiang yixue zazhi = West China journal of stomatology	Retrieved in abstract only
6540371	S J de Vries and R Wentges	[Ear drum grommets and swimming]	Nederlands tijdschrift voor geneeskunde	Retrieved in abstract only
3955712	F Odehnal and A Tomecková	[Tympanic ventilation tubes in the so-called "glue ear"]	Ceskoslovenská otolaryngologie	Retrieved in abstract only
6542693	M Lucic	[Therapy of exudative chronic otitis using ventilating tubes. Results and consequences]	Srpski arhiv za celokupno lekarstvo	Retrieved in abstract only
16903334	Beata Zielnik-Jurkiewicz and Olga Olszewska-Sosinska and Magdalena Rakowska	[Results of treatment with tympanostomy tubes in children with otitis media with effusion]	Otolaryngologia polska = The Polish otolaryngology	Retrieved in abstract only
14740537	Ivan Baljosevic and Vladan Subarevic and Nikola Mircetic and Jovana Jecmenica and Jovica Karanov and Zorica Vasiljevic	[Suppurative middle ear infection as a complication after tympanostomy tube placement]	Medicinski pregled	Retrieved in abstract only
9518333	B Zielnik-Jurkiewicz and J Gutkowska	[Effect of surgical treatment of otitis media with effusion on children. Personal experience]	Otolaryngologia polska = The Polish otolaryngology	Retrieved in abstract only
4040160	Y Somekawa and K Kobayashi and T Yamaguchi and K Shimoda and T Suzuki and A Kataura	[Long-term result of grommets in children with secretory otitis media]	Nihon Jibiinkoka Gakkai kaiho	Retrieved in abstract only

10377838	S Sankovic and R Dergenc	[Surgical treatment of secretory otitis media: persistent perforation as a rare complication]	Srpski arhiv za celokupno lekarstvo	Retrieved in abstract only
22433702	NA	[First experience with the use of tympanostomy for the management of acute otitis media in children]	Vestnik otorinolaringologii	Retrieved in abstract only
3444993	B Pérez Piñero and D López Aguado and M E Campos Bañales	[Tympanosclerosis and the ventilation tube]	Revue de laryngologie - otologie - rhinologie	Retrieved in abstract only
21166142	Elzbieta Hassmann-Poznanska and Artur Gozdziwski and Malgorzata Piszcz and Hanna Zajackiewicz and Bozena Skotnicka	[Influence of tympanic membrane changes on immittance and extended frequency audiometric findings]	Otolaryngologia polska = The Polish otolaryngology	Retrieved in abstract only
7725152	B Ristic and K Haralampiev and R Filipovski	[Complications in secretory otitis media treated with aeration-drainage tubes]	Srpski arhiv za celokupno lekarstvo	Retrieved in abstract only
20873100	Elzbieta Hassmann-Poznanska and Artur Gozdziwski and Malgorzata Piszcz and Bozena Skotnicka	[Long term sequelae of otitis media with effusion during childhood]	Otolaryngologia polska = The Polish otolaryngology	Retrieved in abstract only
7861292	S Harigai	[Longitudinal studies in hearing-impaired children with Down's syndrome]	Nihon Jibiinkoka Gakkai kaiho	Retrieved in abstract only
156771	M Wayoff and J P Kocher and C Chobaut and C Simon	[Long-term results of transtympanic drainage]	Journal français d'oto-rhino-laryngologie; audiophonologie, chirurgie maxillo-faciale	Retrieved in abstract only
3670236	M Stura and G Ivani	[Insertion of trans-tympanic drainage in muco-gelatinous otitis in children]	Minerva pediatrica	Retrieved in abstract only
4039907	M Klein	[Presentation and trial of a new medium-duration transtympanic ventilator]	Annales d'oto-laryngologie et de chirurgie cervico faciale : bulletin de la Société d'oto-laryngologie des hôpitaux de Paris	Retrieved in abstract only
1535965	C Chavanne	[Surgical treatment of secretory otitis media in children]	Revue médicale de la Suisse romande	Retrieved in abstract only
3705232	J F Sederberg-Olsen and A E Sederberg-Olsen and A M Jensen	[Complications of grommets in specialist practice]	Ugeskrift for laeger	Retrieved in abstract only
2254809	M Suetake and T Kobayashi and T Takasaka and H Shinkawa	[Middle ear air volume and prognosis of secretory otitis media]	Nihon Jibiinkoka Gakkai kaiho	Retrieved in abstract only
10337163	S Chodynicky and B Lazarczyk	[The results of treatment of otitis media with suppuration in children by ventilation tubes]	Otolaryngologia polska = The Polish otolaryngology	Retrieved in abstract only
12235880	Hiroshi Ogawa	[Otitis media with effusion: a study of 346 cases in an outpatient clinic]	Nihon Jibiinkoka Gakkai kaiho	Retrieved in abstract only

none	Viada J. and Carcamo F. and Carrillo L.	Evaluation of results with middle ear ventilation tubes in treatment of serous otitis	Revista de Otorrinolaringologia y Cirurgia de Cabeza y Cuello	Retrieved in abstract only
none	Sanchez T.G. and Ognibene R.Z. and Gondin M. and Bento R.F.	Audiometric findings after ear ventilation tubes extrusion	Revista Brasileira de Otorrinolaringologia	Retrieved in abstract only
none	Scherer H.	Transtympanic ventilation of the middle ear by means of tympanic drainage	Praxis Magazin Med.	Retrieved in abstract only
none	Coates H. and Chai F. and Oates J.	The use of surface treated and silver oxide impregnated tympanostomy tubes in reducing post-operative otorrhoea	Australian Journal of Otolaryngology	Retrieved in abstract only
none	Suzuki M.	A long-term follow-up of secretory otitis media in children	Otolaryngology	Retrieved in abstract only
none	Fujita A. and Kurata K. and Takahashi H. and Takagita S.	Clinical efficacy of clarithromycin treatment of refractory otitis media with effusion	Practica Otologica	Retrieved in abstract only
4666579	King J.T.	Modified exploratory ulterior tympanotomy in chronic secretory otitis media in children	Trans. Amer. Acad. Ophthal. Otolaryng.	Retrieved in abstract only
4819101	Mawson S.R.	Middle ear effusions: therapy and clinical results	Annals of Otology, Rhinology and Laryngology	Retrieved in abstract only
9055175	Hui Y. and Park A. and Crysdale W.S. and Forte V.	Ototoxicity from ototopical aminoglycosides	Journal of Otolaryngology	Retrieved in abstract only
none	Neubauer R. and Slama K.	Experience with the use of a ventilation tube STIPULA in the treatment of otitis media chronica secretoria at the ENT department of the masaryk hospital in Usti nad Labem during a 17-year period	Otorinolaryngologie a Foniatrie	Retrieved in abstract only
none	Ohnishi T.	Comparative study of middle ear ventilating tubes	Otolaryngology	Retrieved in abstract only
none	Paquelin F. and Doncieux D. and Luboinski B. and Henin J.M.	Continuous transtympanic drainage in children with a non purulent cryptogenetic exudate of the middle ear	ANN.OTO-LARYNG.	Retrieved in abstract only
none	Brown M.W.	Glue ear	South Australian Clinics	Retrieved in abstract only
none	Yokoyama T.	Results of tympanostomy tube for children with secretory otitis media	Otolaryngology	Retrieved in abstract only
none	Prauzinska M. and Sroczynski J. and Pucher B. and Szydlowski J.	The effectiveness of ventilation tubes treatment in otitis media with effusion in children	Family Medicine and Primary Care Review	Retrieved in abstract only
none	Husson Y. and Troy C.	Tubal catarrh	Concours Medical	Retrieved in abstract only
25598382	Wan X. and Yang J. and Jia H.	Efficacy of surgery, recurrence factors and treatment strategies of otitis media with effusion in children	Zhonghua er bi yan hou tou jing wai ke za zhi = Chinese journal of otorhinolaryngology head and neck surgery	Retrieved in abstract only

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5081036		Observations during long-term drainage of the middle ear in chronic catarrh of the eustachian tube	Zeitschrift fur Laryngologie, Rhinologie, Otologie und ihre Grenzgebiete	Retrieved in abstract only
none	Rashid D. and Ahmad B. and Malik S.M. and Rahat Z.M. and Malik K.Z.	Otitis media with effusion-cost effective options	Journal of the College of Physicians and Surgeons Pakistan	Retrieved in abstract only
none	Deutsch H.J.	Serous otitis media. An effective, practical approach to diagnosis and therapy of this most common cause of conductive loss of hearing in children	Penn. Med.	Retrieved in abstract only
none	Laurikainen E. and Suonpaa J.	Topical use of aminoglycoside ear drops in children with purulent draining ventilation tubes. A follow-up study	Acta Oto-Laryngologica	Retrieved in abstract only
5773899	Cross J.P.	The expanding role of tympanostomy tubes	Virginia Med.Mth.	Retrieved in abstract only
none	Attallah M.S. and Essa A.E.	Common complications following ventilation tube insertion	Indian Journal of Otology	Retrieved in abstract only
none	Boedts D.	Middle ear ventilation and tympanic membrane tube (Dutch)	Tijdschrift voor Geneeskunde	Retrieved in abstract only
none	Yagi T.	The long-term result of middle ear ventilation tube	Otolaryngology	Retrieved in abstract only
1549417	Landay S.E. and Schwartz R.H.	Recommendations for swimming for children with ear infection and/or associated complications	Pediatric Infectious Disease Journal	Retrieved in abstract only
none	Mees K.	The use of grommets in serous otitis media	Munchener Medizinische Wochenschrift	Retrieved in abstract only
none	Namyslowski G. and Gierek T. and Pilch J. and Iwanowski P.	Tarflen tubes for draining of tympanic cavity	Otolaryngologia Polska	Retrieved in abstract only
none	Coates H.	Preventing and treating grommet tube otorrhoea	Medicine Today	Retrieved in abstract only
none	Walker P.	Persistent perforation following spontaneous extrusion of ventilation tubes in children	Australian Journal of Otolaryngology	Retrieved in abstract only
none	Coates H. and Sashikumar A.	A prospective clinical trial of antibiotic/steroid ear drops and incidence of infection following ventilation tube insertion	Journal of the Otolaryngological Society of Australia	Retrieved in abstract only
none	Somekawa Y.	Ear discharge following insertion of tympanostomy tube	Oto-Rhino-Laryngology Tokyo	Retrieved in abstract only
6821430	Leopold D.A. and McCabe B.F.	Factors influencing tympanostomy tube function and extrusion: A study of 1,127 ears	Otolaryngology - Head and Neck Surgery	Retrieved in abstract only

none	Bartonkova K. and Janecek D. and Lenert R.	Mean time of insertion of a pressure equalizing tube (PET)	Otorinolaryngologie a Foniatrie	Retrieved in abstract only
none	Elverland H.H. and Haugeto O.K. and Andersen L.	Adenoidectomy and secretory otitis media	Acta Oto-Laryngologica	Retrieved in abstract only
8486102	Pulec J.L. and Deguine C.	Secretory otitis media (Glue Ear)	Ear, Nose and Throat Journal	Retrieved in abstract only
none	Slapak I. and Hornik P. and Machac J. and Machalova M. and Fryckova A. and Chrobok V. and Vokurka J. and Hybasek I.	Use of a ventilation tube and recurrent otitis media in child age	Otorinolaryngologie a Foniatrie	Retrieved in abstract only
none	Hatanaka E.	Results of treatment with large ventilating tubes and grommet tubes in children with middle ear effusion	Otolaryngology	Retrieved in abstract only
none	Pospiech L. and Rak J. and Jaworska M. and Klempous J.	Effects of surgical and pharmacological management of otitis media with effusion in children admitted to the Otolaryngology Department of the Medical University of Wroclaw	Przegląd Pediatryczny	Retrieved in abstract only

Appendix C. Study Design

Key Question 1 Design

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
Augustsson 2006 16214225 Sweden	RCT	Not reported	.					
Bernard 1991 1861917 Canada	RCT	Government	middle ear effusion for greater than 3 months	yes	yes	2.5-7	Down's syndrome, Cleft palate, Speech/Language disorder, documented immune insufficiency	5/78
Casselbrant 2009 19819563 1997-2005 U.S.	RCT	Not reported	bilateral middle-ear effusion (MEE) for at least 3 months, unilateral for 6months or longer or unilateral for 3 months after extrusion of a tympanostomy tube	.		2-4	Down's syndrome, Cleft palate, Other craniofacial anomalies	nd/78
Chaudhuri 2006 23120310 India	RCT	Not reported	.	yes	yes	0-12		2/8 weeks
D'Eredità 2006 16406076 1/2001- 1/2003 Italy	RCT	Not reported	OME for at least 3 months duration		yes	2-6		12/52
Gates 1989 2492178 U.S.	RCT	Not reported	chronic effusion indicates a middle ear effusion without pain, redness, or bulging of the tympanic membrane	yes	yes	4-8		18/2 years
Gates 1988 3336263 U.S.	RCT	Not reported	.					18/2 years
Gates 1987 3683478 4/1980- 6/1984 U.S.	RCT	Government/ Industry	iddle ear effusion without pain, redness, or bulging of the tympanic membrane	.	yes	0-8		18/104

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
Gates 1985 4040338 (University of Texas Otitis Media Study Center) U.S.	RCT	Not reported	.			4-8		otoscopy/tymp anometry every 6 weeks, audiogram every 12 weeks/2 years
Hall 2009 19260880 (ALSPC and COMET) 11/1993-1/1996 UK	RCT	Government	confirmation by pneumatic otoscopy and tympanometry	yes	yes			at ages 4.5 years, 7-8 years old
Hammarén-Malmi 2005 15995051 03/2001-12/2002 Finland	RCT	Government/ Academic/H ospital	as judged by examination with a pneumatic otoscope; >=3 episodes of acute otitis media during the preceding 6 months or ?5 episodes of acute otitis media during the preceding 12 months; ;	.		1-4	excluded cleft palate, asthma, diabetes	2/52
Mandel 1992 1565550 11/1981-06/1987 U.S.	RCT	Government/ Academic/H ospital	middle ear effusion lasted at least 2 months; middle ear effusion persisting after at least one 14-day abx and pseudoephedrine hydrochloride-maleate syrup; middle ear effusion persisting after at least one 14-day abx and pseudoephedrine hydrochloride-maleate syrup	.	yes	0.58-12	excluded Down's syndrome, Other craniofacial anomalies, Pre-existing hearing loss, Speech/Language disorder, cystic fibrosis, DM, seizure, AOM, purulent rhinitis	36/156
Mandel 1989 2789777a 09/1979-09/1984 U.S.	RCT	Government	documented MEE of at least 2 months' duration; no symptoms consisting of otalgia or vertigo; MEE persisting after at least one 14-day course of an antimicrobial drug and pseudoephedrine hydrochloride-chlorpheniramine maleate syrup; no symptoms consisting of otalgia or vertigo; MEE persisting after at least	.	yes	0.58-12	excluded Down's syndrome, Other craniofacial anomalies, asthma, cystic fibrosis, diabetes mellitus, seizure	36/156

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
			one 14-day course of an antimicrobial drug and pseudoephedrine hydrochloride-chlorpheniramine maleate syrup					
Mandel 1989 2789777b 09/1979-09/1984 U.S.	RCT	Government	documented MEE of at least 2 months' duration; no symptoms consisting of otalgia or vertigo; MEE persisting after at least one 14-day course of an antimicrobial drug and pseudoephedrine hydrochloride-chlorpheniramine maleate syrup; no symptoms consisting of otalgia or vertigo; MEE persisting after at least one 14-day course of an antimicrobial drug and pseudoephedrine hydrochloride-chlorpheniramine maleate syrup	.	yes	0.58-12	excluded Down's syndrome, Other craniofacial anomalies, asthma, cystic fibrosis, diabetes mellitus, seizure	36/156
Maw 1999 10459904 4/1991-12/1992 UK	RCT	Government	; confirmation of bilateral OME by otoscopy; disruptions to speech, language, learning, or behaviour	yes	yes	DOB 4/1/1991- DOB 12/31/1992		2/78
MRC Multicenter Otitis Media Study Group 2004 (TARGET) 15373863 11/1994-06/2001 UK	RCT	Not reported	two occasions separated by 3 months	yes	yes			2/52
MRC Multicentre Otitis Media Study Group 2012 (TARGET) 22443163	RCT	Government	bilateral OME over 12-week watchful waiting period	yes	yes	3.25-6.75	excluded History of ear or adenoid surgery	5/104

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
4/1994-1/1998 UK								
Nguyen 2004 15126745 01/1998-01/2003 Canada	RCT	Not reported	OM with effusion persisting for more than 3 months or producing a conductive hearing loss (HL) greater than 30 dB with a type B tympanogram; or 3) both; more than three episodes during the preceding 6-month period or more than four during the preceding 12 month period; first surgical treatment of OM; first surgical treatment of OM	yes	yes	1.5-18	excluded Down's syndrome, Other craniofacial anomalies, Primary ciliary dyskinesia, immune deficiency	>=2/52
Paradise 2001 11309632 6/1991-12/1995 U.S.	RCT	Government/ Industry	middle ear effusion that appeared substantial in quantity and persisted despite treatment with anti-microbial drugs for 90 days in the case of bilateral effusion or 135 days in the case of unilateral effusion.audiometric examinations; audiometric examinations	yes	yes	0.04-1.17		nr/104
Popova 2010 20399511 2007-2009 Bulgaria	RCT	No funding	OME is defined as asymptomatic middle ear effusion without signs of inflammation characteristic of the acute otitis media (AOM).	yes	yes	3-7		12/52 weeks
Rach 1991 2070526 Netherlands	RCT	Government	bilateral flat tympanograms (type B) at two consecutive screenings at any time during the follow-up period	yes		2-2	excluded congenital ear disorders (sensorineural loss) or defects in their speech-producing apparatus (e.g. cleft palate), neurological or serious visual disorders, emotional aberrations or mental defects	1/26
Rovers 2000 10969126 01/1996-04/1997 Netherlands	RCT	Government	persistent (4–6 months) bilateral OME (confirmed by tympanometry and otoscopy) by the ENT surgeon during subsequent observations	yes	yes	0-0.75	excluded Down's syndrome, Cleft palate, schisis, asthma, cystic fibrosis, and sensorineural hearing loss	3 successive tests; 3 monthly tympanometry and otoscopy measurements, audiometry every 6

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
								months/52 weeks
Vlastos 2011 21205368 5/2007-5/2008 Greece	RCT	Not reported	The diagnosis of OME was based on otoscopy, tympanography and pure tone audiometry. Specifically, the presence of an opaque or thickened tympanic membrane, air-fluid level, or bubbles, or the inability to visualise the incudostapedial joint, were considered signs of OME, in children with a type B tympanogram (compliance <0.2 ml) and an audiogram with an air-bone gap of 20 dB or a hearing loss of 30 dB but no more than 55 dB in at least one frequency in both ears. Absence of the light reflex was not regarded as a specific sign of OME.; Absence of the light reflex was not regarded as a specific sign of OME; Absence of the light reflex was not regarded as a specific sign of OME	yes	yes	3-7		3/52 weeks
Grievink 1993 8246466 (Nijmegen Otitis Media study) 9/1982-8/1983 Netherlands	NRCS, prospective	Not reported	.	yes				nr/7 years
Hubbard 1985 4039792 1/1979-1/1979 U.S.	NRCS, prospective	Not reported	cleft palate, previous myringotomy	.		5-11	included cleft palate	.
Peters	NRCS,	Not reported	.	yes				364-416

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
1994 8195687 8/1982- 7/1983 Netherlands	prospective							weeks
Stenstrom 2005 16330739 1985-1989 Canada	NRCS, prospective	Academic/Hospital	long-standing middle ear effusion [>3 months]	.	yes	2.5-7		1/56
Veletic 2011 21397957 2004-2009 Croatia	NRCS, prospective	No funding	CSOM lasting at least 3 months	.	yes	2-12		$\geq 6/\geq 6$ months
Yagi 1977 321716 Sudan	NRCS, prospective	Not reported	secretory otitis media; Clinical evidence of fluid in the middle ear in addition to the audiometric findings	.	yes	3-12		nd/6 weeks
Yousaf 2012 23855103 6/2008- 12/2011 Pakistan	NRCS, prospective	Not reported	X-Ray nasopharynx lateral view was taken to see if there were adenoids.	.	yes	2-8		nd/144
Coyte 2001 11309633 1992-1997 Canada	NRCS, retrospective	Not reported	.			0-19		
Forquer 1982 6184891 U.S.	NRCS, retrospective	Not reported	chronic serous otitis media			0-9	excluded cleft palate, Pre-existing hearing loss, history of mastoiditis or cholesteatoma	.
Kadhim 2007 17279052 1981-2004	NRCS, retrospective	Not reported	.					

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
Australia								
Kobayashi 2012 22386274 1996-1999 Japan	NRCS, retrospective	Not reported	.				included cleft palate	every 6 months from 0-6 years of age, annually after 7 years of age
Kremer 1979 456299 1966-1974 Israel	NRCS, retrospective	Not reported	serous otitis media					3/≥13
Marshak 1980 6778336 Israel	NRCS, retrospective	Not reported	chronic secretory otitis media		yes	0-8		4 to 8/104 weeks
Motta 2006 17465378 1/1/2001-12/31/2001 Italy	NRCS, retrospective	Not reported	AAP definition (2004): Tympanic mucosa congestion, possibly with exudate, without acute infection; Recurrent febrile episodes related to adenotonsillar inflammation (≥2 episodes in previous 12 months), with OME or AOM. Underwent adenoidectomy; Recurrent febrile episodes related to adenotonsillar inflammation (≥2 episodes in previous 12 months), with OME or AOM. Underwent adenoidectomy	.		2-11	excluded other craniofacial anomalies, genetic syndromes	minimum 104
Navarro 1997 9382253 09/1982-08/1983 Netherlands	NRCS, retrospective	Government	.	yes		2-4		untill 7-8 years old
Reiter 2009 19929085	NRCS, retrospect	Not reported	OME lasting more than 3 months; atelectasis/tympanic membrane	.	yes	0-14	included cleft palate	12/312

Study	Study design	Funding source	Inclusion criteria	Tympanography	Hearing test	Age range (y)	Subgroups	Number of assessments /followup duration
Germany	ective		retraction pockets					
Robson 1992 1431515 1976-1988 UK	NRCS, retrospective	Not reported	operated on by one plastic surgeon for cleft lip, cleft palate or a combination of cleft lip and palate	.			included cleft palate	
Schilder 1997 9372253 09/1982-08/1983 Netherlands	NRCS, retrospective	Government ?	.	yes		2-4		nd/from 2-4 yo to 7-8 yo
Wolter 2012 22883987 1991-2009 Canada	NRCS, retrospective	Not reported	.		yes	0.7-17	included primary ciliary dyskinesia	nr
Xu 2003 12930655 09/1997-05/2000 China	NRCS, retrospective	Government	.	yes		1.3-10	included cleft palate	2/nd
Youssef 2013 24265883 03/2007-01/2009 Egypt	NRCS, retrospective	Not reported	bilateral OM, eligible for surgical intervention, no previous myringotomy or TT	yes				nd/52

Key Question 2 Design

Author Year PMID Years of recruitment Country	Design	Number of participants	Age Range (y)	Inclusion criteria	Exclusion criteria
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Author Year PMID Years of recruitment Country	Design	Number of participants	Age Range (y)	Inclusion criteria	Exclusion criteria
Casselbrant 1992 1565551 3/1981- 1/1988 U.S.	RCT	264	0.6, 2.9	3 or more episodes of AOM during the preceding 6 months or 4 or more episodes during the preceding 12 months, but free of middle ear effusion at the time of entry	Exclusion criteria: potentially complicating or confounding conditions, e.g. asthma, chronic sinusitis or previous tonsillectomy or adenoidectomy
El-Sayed 1996 Saudi Arabia	RCT	68	0, 3	>= 3 attacks of acute otitis media diagnosed, documented and treated by their referring physician in the 6 month period prior to referral	
Gonzalez 1986 3537596 1/1982- 2/1983-12/1983- 11/1985 U.S.	RCT	63	0.5, 10	>= 3 episodes of AOM during the past 6 months, or >=4 episodes in the past 18 months	Exclusion criteria: Down syndrome, cleft palate, previous tympanostomy tubes
Kujala 2012 22466327, 24445832 3/2002-6/2004 Finland	RCT	300	0, 2	at least 3 AOM episodes during the past 6 months	Exclusion criteria: Cranial abnormalities, chronic otitis media with effusion, a prior adenoidectomy or tympanostomy tubes, documented immunological disorders or ongoing antimicrobial prophylaxis for a disease other than AOM
Mattila 2003 12578443 RCT 1996- 1999 Finland	RCT	137	0.83, 2	>3-5 episodes within six months or 4-6 episodes during the last year; a visually abnormal membrane on a flat B-type tympanogram, signs of effusion in the middle ear cavity and symptoms that related to acute otitis	
Grindler 2014 24627408 1/2009- 2/2012 U.S.	NRCS, prospective	1208	0.5, 2		Exclusion criteria: caregivers unable to provide consent; caregivers unable to complete the survey forms in English

Author Year PMID Years of recruitment Country	Design	Number of participants	Age Range (y)	Inclusion criteria	Exclusion criteria
Mattila 2003 12578443 NRCS 1996-1999 Finland	NRCS, prospective	169	0.83, 2	>3-5 episodes within six months or 4-6 episodes during the last year; a visually abnormal membrane on a flat B-type tympanogram, signs of effusion in the middle ear cavity and symptoms that related to acute otitis	

Key Question 4 Design

Author Year PMID Date Country	Study design	Age range (years)	Inclusion criteria	No. assessments/planned duration (weeks)
Goldstein 2005 15689760 7/1996-6/1999 U.S.	RCT	0.5, 6	Children undergoing tube insertion at the Children's Hospital of Pittsburgh. bilateral myringotomy and tube insertion for recurrent AOM or chronic otitis media with effusion (OME). Exclusion: Children who were immunocompromised (immunodeficiency syndrome, AIDS or HIV-positive status, diabetes mellitus, undergoing chemotherapy, chronic steroid dependence), had a craniofacial syndrome or a history of a cleft palate, or had undergone prior ear surgery except for tympanostomy tube placement	12/52
Parker 1993 8024107 12/1989-2/1991 U.S.	RCT		Patients with tympanostomy tubes	4/52
Becker 1987 3586818 4/1985-9/1985 U.S.	NRCS, prospective		referrals: all patients undergoing tympanostomy and insertion of ventilation tubes. Most cases were chronic otitis media with effusion unresponsive to medical management for 3 or more months. Any occasional indication was recurrent acute otitis media.	0
Cohen 1994 8289048 1990- 1992 Israel	NRCS, prospective	3, 12	Underwent plastic ventilation tube insertion because of recurrent otitis media or serious otitis media complicated by impaired hearing	78-130
el Silimy 1986 3780019 UK	NRCS, prospective	4, 14	Grommets inserted, after myringotomy and aspiration of the middle ear contents, in the anterosuperior quadrant of the tympanic membrane. none	3/26
Kaufmann 1999 10546304 1/1996-1/1997 Switzerland	NRCS, prospective	0.23, 0.67	Got tubes at the same clinic, but by different surgeons.	every 8-12 weeks until tubes extruded
Salata 1996 8607955 U.S.	NRCS, prospective		Children who were undergoing myringotomy with placement of tympanostomy tubes	every 12 weeks until tubes extruded
Smelt 1984	NRCS,	2, 15	The operations were done by the authors. A Shepard grommet was inserted into the antero-inferior quadrant of	every 8 weeks until tubes

Author Year PMID Date Country	Study design	Age range (years)	Inclusion criteria	No. assessments/planned duration (weeks)
6538215 UK	prospective		the drumhead if myringotomy liberated thick glue or copious thin fluid. This was done either as the only procedure or combined with tonsillectomy or adenotonsillectomy.	extruded
Wang 2009 19251534 Taiwan	NRCS, prospective		OME who had received VT insertion. none had URI or otorrhea within 1 week before experiment	1/2

Key Question 5 Design

Study	Study design	Age range (y)	Inclusion criteria	Exclusion criteria	Assessment times/followup (weeks)
van Dongen 2014 24552319 25896832 6/2009-5/2012 Netherlands	RCT	1, 10	otorrhea that had lasted for up to 7 days	Down syndrome, Cleft palate, craniofacial anomalies, immunodeficiency, temperature >38.5 C, received antibiotics during the previous 2 weeks, TT placed within the previous 2 weeks, had an episode of otorrhea in the previous 4 weeks, >=3 episodes in the previous 6 months, or >=4 episodes in the previous year	2/26
Goldblatt 1998 10190709 U.S.	RCT	4+	recurrent acute otitis media (AOM)		4/3
Heslop 2010 20979100 5/2003-5/2007 Chile	RCT	0, 10	secretory otitis media (SOM) for more than 3 months or recurrent acute otitis media (AOM)	non-Caucasians, otorrhea due to other ear diseases other diseases or handicaps, or treatment with systemic or local antibiotics during the preceding 3 weeks, taking topical or systemic steroids or nonsteroidal anti-inflammatory drugs	1
Ruohola 1999 10190921 03/1996- 05/1997 Denmark	RCT	0.5, 12	Definition of otorrhea: drainage started within 48 hours before examination at the study clinic	Down syndrome, Cleft palate, diabetes mellitus, known immunodeficiency, middle ear granulomatous tissue or polyp, TT or abx in preceding 2 weeks, otorrhea during preceding 4 weeks, steroids use, allergy to penicillin or amoxicillin	1/2
Ruohola 2003 12728089 09/1998- 06/1999 Finland	RCT	0.6, 6	Definition of otorrhea: started within 48 hours before recruitment	Down syndrome, Cleft palate, granulation of polyp in the tympanic membrane, immunodeficiency, TT or antibiotics/steroid use in the preceding 2 weeks, TT in the preceding 4 weeks, allergy to penicillin,	
Dohar 2006 16880248 5/2003-5/2004 U.S., Finland	RCT	0.5, 12	Definition of otorrhea: clinical diagnosis of uncomplicated AOM with otorrhea >3 weeks duration	otorrhea present for ?3 weeks and those with acute or malignant otitis externa. Additional enrollment exclusions included known or suspected fungal or mycobacterial ear infections, a history of or active viral infections of the tympanic membrane, mastoiditis, or infections requiring systemic antibiotic therapy. Patients were also excluded for	4/3

Study	Study design	Age range (y)	Inclusion criteria	Exclusion criteria	Assessment times/followup (weeks)
				otologic surgery (except that confined to the tympanic membrane) in the previous year or if they presented with or had a history of diabetes, immunosuppressive disorders, acute or chronic renal disease, active hepatitis, chronic nasal obstruction and/or persistent rhinorrhea, complicating structural abnormalities, known or suspected quinolone hypersensitivity, and, in girls, menarche	
Granath 2008 18565598 -2/1998-12/2002 Sweden	RCT	0, 3	recurrent acute otitis media (AOM): a minimum of 3 episodes of AOM before 12 months of age, or 6 episodes before 18 months		nd/4
Roland 2003 14660913 3/2000-2/2001 U.S.	RCT	0.5, 12	Definition of otorrhea: clinical diagnosis of acute otitis media with visible otorrhea of 3 weeks duration or less, patent tympanostomy tube	fungal or mycobacterial ear infections, active herpes simplex, vaccinia, varicella, or overt viral infections of the tympanic membrane, mastoiditis or other suppurative noninfectious ear infections, chronic nasal obstruction or persistent rhinorrhea, a prior or current history of immunosuppressive disorders or immunosuppressive therapy, acute renal disorders, active hepatitis, diabetes, or conditions that may predispose to neurosensory hearing loss	4/3
Roland 2004 14702493 U.S.	RCT	0.5, 12	Definition of otorrhea: drainage visible to the parent or guardian of >3 weeks duration	otorrhea had been present for > 3 weeks, acute or malignant otitis externa, known or suspected fungal or mycobacterial ear infections, a history of or active viral infection of the tympanic membrane, mastoiditis, or infections requiring systemic antibacterial therapy, requirement for otologic surgery (except that confined to the tympanic membrane) in the previous year or when they presented with or had a history of diabetes, immunosuppressive disorders, acute or chronic renal disease, active hepatitis, chronic nasal obstruction and/or persistent rhinorrhea, complicating structural abnormalities, known or suspected quinolone hypersensitivity, and, in girls, menarche.	4/3
Strachan 2000 10865480 UK	RCT		Definition of otorrhea: a degree of discharge from the ear with ventilation tubes in-situ		2/3
Waycaster 2004 no PMID U.S.	RCT	0.5, 12	Otorrhea of three weeks' duration or less, acute otitis media. and a patent tympanostomy tube.		1/2
Dohar 1999 10326811 U.S.	NRCS, prospective	1, 12	Definition of otorrhea: acute purulent otorrhea of presumed bacteriologic origin for less than 3 weeks; patent tubes	otorrhea >3 weeks; other surgery; known streptococcus infection; requiring systemic antibiotics;	4/3

Appendix D. Arm Details

Key Question 1 Arm Details

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
Augustsson 2006 16214225 Sweden	Tympanostomy tubes	.			
Augustsson 2006 16214225 Sweden	Control (those who were referred to an ENT-department from screening or from other doctors because of ear disease, usually SOM, but never so longstanding that they qualified for treatment with tympanostomy tubes up to 14 years of age)	.			
Bernard 1991 1861917 Canada	Antibiotic prophylaxis	sulfisoxazole, 75 mg/kg bid, 6 mo.	otomicroscopic findings (redness of the TM, absence of landmarks), acute -onset ear pain w/o fever or otorrhea	an oral non-sulfa-based antibiotics (usually amoxicillin)	.
Bernard 1991 1861917 Canada	Myringotomy+TT		discharge from the ear and presence of pathogens commonly associated with AOM	an oral non-sulfa-based antibiotics (usually amoxicillin)	Reuter bobbin VTs for the 1st 10 pts, then Richard "T" VTs
Casselbrant 2009 19819563 1997-2005 U.S.	Myringotomy+TT	amoxicillin, 40 mg/kg/day in two divided doses, 10 d.	.	fever, earache or recent onset of ear tugging; and irritability; Otoscopic criteria: erythema and/or white opacification (other than from scarring) of the tympanic membrane, fullness or bulging of the tympanic membrane, white fluid level, and otorrhea from a perforation of a previously intact tympanic membrane.	Teflon Armstrong-type tympanostomy tube
Casselbrant 2009 19819563 1997-2005 U.S.	TT AND myringotomy AND adenoidectomy	amoxicillin, 40 mg/kg/day in two divided doses, 10 d.	.	fever, earache or recent onset of ear tugging; and irritability; Otoscopic criteria: erythema and/or white opacification (other than from scarring) of the tympanic membrane, fullness or bulging of the tympanic	Teflon Armstrong-type tympanostomy tube

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
				membrane, white fluid level, and otorrhea from a perforation of a previously intact tympanic membrane.	
Casselbrant 2009 19819563 1997-2005 U.S.	Myringotomy AND adenoidectomy	amoxicillin, 40 mg/kg/day in two divided doses, 10 d.	.	fever, earache or recent onset of ear tugging; and irritability; Otoscopic criteria: erythema and/or white opacification (other than from scarring) of the tympanic membrane, fullness or bulging of the tympanic membrane, white fluid level, and otorrhea from a perforation of a previously intact tympanic membrane.	.
Chaudhuri 2006 23120310 India	Antibiotic prophylaxis (Amoxycillin + carbocisteine)	Amoxycillin, 125 mg (infants), 250 mg (older children), 2 wks; carbocisteine, 5 mL, 2 wks	.		
Chaudhuri 2006 23120310 India	TT + myringotomy +/- adenoidectomy (radial myringotomy in antero inferior quadrant of tympanic membrane with insertion of grommet with or without adenoidectomy under general anesthesia)	.			grommet
Coyte 2001 11309633 1992-1997 Canada	TT (Tympanostomy tubes)	.			
Coyte 2001 11309633 1992-1997 Canada	TT AND adenoidectomy	.			
D'Eredità 2006 16406076 1/2001-1/2003 Italy	TT (Myringotomy with tube insertion (M&T))	Ofloxacin 0.3% otic solution	.		Teflon Shah mini vent1 tube
D'Eredità 2006 16406076	Myringotomy (contact-diode laser myringotomy only (CDLM))	Ofloxacin 0.3% otic solution	.		

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
1/2001-1/2003 Italy					
Forquer 1982 6184891 U.S.	Treated medically, then surgically		.		collar-button or mesh-type tubes
Forquer 1982 6184891 U.S.	Initially treated surgically				collar-button or mesh-type tubes
Gates 1985 4040338 (University of Texas Otitis Media Study Center) U.S.	TT (Tympanostomy tubes)	.			Shepherd type with an internal opening of 1.1 mm
Gates 1985 4040338 (University of Texas Otitis Media Study Center) U.S.	Myringotomy (Myringotomy only)	.			
Gates 1987 3683478 4/1980-6/1984 U.S.	TT (Tympanostomy tubes)	.	effusion + inflammation		Shepard-type
Gates 1987 3683478 4/1980-6/1984 U.S.	TT AND adenoidectomy	.	effusion + inflammation		Shepard-type
Gates 1987 3683478 4/1980-6/1984 U.S.	Myringotomy (Myringotomy only)	.	effusion + inflammation		
Gates 1987 3683478 4/1980-6/1984 U.S.	Myringotomy AND adenoidectomy	.	effusion + inflammation		
Gates 1988 3336263 U.S.	Myringotomy+ TT (placement of TT after bilateral myringotomy)	.		Shepard-type	
Gates 1988 3336263 U.S.	TT AND myringotomy AND adenoidectomy	.		Shepard-type	

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
Gates 1989 2492178 U.S.	Myringotomy (Myringotomy only)	erythromycin ethyl succinate. 50 mg/kg, 10 d.; sulfisoxazole, 150 mg/kg, 10 d.	.		
Gates 1989 2492178 U.S.	Myringotomy+TT	erythromycin ethyl succinate. 50 mg/kg, 10 d.; sulfisoxazole, 150 mg/kg, 10 d.	.		Shepard-type
Gates 1989 2492178 U.S.	Myringotomy AND adenoidectomy	erythromycin ethyl succinate. 50 mg/kg, 10 d.; sulfisoxazole, 150 mg/kg, 10 d.	.		
Gates 1989 2492178 U.S.	TT AND myringotomy AND adenoidectomy	erythromycin ethyl succinate. 50 mg/kg, 10 d.; sulfisoxazole, 150 mg/kg, 10 d.	.		Shepard-type
Hammarén-Malmi 2005 15995051 03/2001-12/2002 Finland	TT (Tympanostomy tubes)	.		antibiotics	
Hammarén-Malmi 2005 15995051 03/2001-12/2002 Finland	TT AND adenoidectomy	.		antibiotics	
Hubbard 1985 4039792 1/1979-1/1979 U.S.	Early TT (University center)	.			tympanostomy tube
Hubbard 1985 4039792 1/1979-1/1979	Late TT (Hospital center)	.			tympanostomy tube

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
U.S.					
Kadhim 2007 17279052 1981-2004 Australia	TT (Tympanostomy tubes)	.			
Kadhim 2007 17279052 1981-2004 Australia	TT AND adenoidectomy	.			
Kobayashi 2012 22386274 1996-1999 Japan	Control (no TT)	.			
Kobayashi 2012 22386274 1996-1999 Japan	TT (Tympanostomy tubes)	.			the Grommet-type ventilation tube (Nagashima, inner diameter 1.0 mm) or the Bobbin-type ventilation tube (Koken B type, inner diameter, 1.6 mm)
Kremer 1979 456299 1966- 1974 Israel	TT + myringotomy +/- adenoidectomy	ampicillin, 0.75-1 g, 14 d.	.		polyethylene tube
Kremer 1979 456299 1966- 1974 Israel	Myringotomy +/- adenoidectomy	ampicillin, 0.75-1 g, 14 d.	.		
Mandel 1989 2789777a 09/1979- 09/1984 U.S.	Control (unspecified intervention)	usually amoxicillin, 14 d.	at least one symptom (fever, otalgia, irritability) and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	an antimicrobial drug, usually amoxicillin, and a decongestant-antihistamine combination for 14 days for recurrent OME	.
Mandel 1989 2789777a 09/1979- 09/1984 U.S.	Myringotomy (Myringotomy only)	usually amoxicillin, 14 d.	at least one symptom (fever, otalgia, irritability) and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with	an antimicrobial drug, usually amoxicillin, and a decongestant-antihistamine combination for 14 days for recurrent OME	.

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
			otorrhea) of acute infection		
Mandel 1989 2789777a 09/1979- 09/1984 U.S.	Myringotomy+TT	usually amoxicillin, 14 d.	at least one symptom (fever, otalgia, irritability) and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	an antimicrobial drug, usually amoxicillin, and a decongestant-antihistamine combination for 14 days for recurrent OME	Teflon Armstrong-type tympanostomy tube
Mandel 1989 2789777b 09/1979- 09/1984 U.S.	Myringotomy (Myringotomy only)	usually amoxicillin, 14 d.	at least one symptom (fever, otalgia, irritability) and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	an antimicrobial drug, usually amoxicillin, and a decongestant-antihistamine combination for 14 days for recurrent OME	.
Mandel 1989 2789777b 09/1979- 09/1984 U.S.	Myringotomy+TT	usually amoxicillin, 14 d.	at least one symptom (fever, otalgia, irritability) and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	an antimicrobial drug, usually amoxicillin, and a decongestant-antihistamine combination for 14 days for recurrent OME	Teflon Armstrong-type tympanostomy tube
Mandel 1992 1565550 11/1981- 06/1987 U.S.	Watchful waiting (no surgery)	.	at least one symptom (fever, otalgia, irritability), and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	.	
Mandel 1992 1565550 11/1981- 06/1987 U.S.	Myringotomy (Myringotomy only)	.	at least one symptom (fever, otalgia, irritability), and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	.	
Mandel 1992 1565550 11/1981- 06/1987 U.S.	Myringotomy+TT	.	at least one symptom (fever, otalgia, irritability), and one sign (bulging or fullness of the tympanic membrane, white fluid level, acute perforation with otorrhea) of acute infection	.	
Marshak 1980 6778336 Israel	TT (Tympanostomy tubes)	.			

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
Marshak 1980 6778336 Israel	Myringotomy AND adenoidectomy	.			
Maw 1999 10459904 4/1991- 12/1992 UK	TT (Tympanostomy tubes within 6 weeks)	.	confirmation of bilateral OME by otoscopy and tympanometry	.	
Maw 1999 10459904 4/1991- 12/1992 UK	Watchful waiting (for 9 months then tubes if needed)	.	confirmation of bilateral OME by otoscopy and tympanometry	.	
Motta 2006 17465378 1/1/2001- 12/31/2001 Italy	TT AND adenoidectomy	.			
Motta 2006 17465378 1/1/2001- 12/31/2001 Italy	Adenoidectomy (Adenoidectomy only)	.			
MRC Multicenter Otitis Media Study Group 2004 (TARGET) 15373863 11/1994- 06/2001 UK	TT + myringotomy +/- adenoidectomy (TT in 15, TT+ AD in 17)	.			ventilation tubes (VTs – grommets)
MRC Multicenter Otitis Media Study Group 2004 (TARGET) 15373863 11/1994- 06/2001 UK	Control (no TT)	.			
MRC	TT AND adenoidectomy	.			Shepard

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
Multicentre Otitis Media Study Group 2012 (TARGET) 22443163 4/1994-1/1998 UK					
MRC Multicentre Otitis Media Study Group 2012 (TARGET) 22443163 4/1994-1/1998 UK	TT (Tympanostomy tubes)	.			Shepard
Navarro 1997 9382253 09/1982-08/1983 Netherlands	TT (Tympanostomy tubes)	.			
Navarro 1997 9382253 09/1982-08/1983 Netherlands	Control (unspecified intervention)	.			
Nguyen 2004 15126745 01/1998-01/2003 Canada	TT (Tympanostomy tubes)	10 d.			pressure equalization tubes
Nguyen 2004 15126745 01/1998-01/2003 Canada	TT AND adenoidectomy	10 d.			pressure equalization tubes
Paradise 2001 11309632	Early TT	.		Antimicrobial drugs were routinely prescribed for episodes of acute	Armstrong

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
6/1991-12/1995 U.S.				otitis media	
Paradise 2001 11309632 6/1991-12/1995 U.S.	Late TT (six months later if bilateral effusion persisted or nine months later if unilateral effusion persisted)	.		Antimicrobial drugs were routinely prescribed for episodes of acute otitis media	Armstrong
Paradise 2001 11309632 6/1991-12/1995 U.S.	Randomization withheld	.			Armstrong (optional tube insertion)
Paradise 2001 11309632 6/1991-12/1995 U.S.	Not eligible for randomization	.		.	
Popova 2010 20399511 2007-2009 Bulgaria	TT AND myringotomy AND adenoidectomy	.	Diagnosis of AOM required the finding of middle ear effusion on otoscopy with at least one symptom, i.e., fever, earache or recent ear tugging, irritability and one sign of inflammation, i.e., erythema and/or white opacification of the tympanic membrane, otorrhea from a perforation of a previously intact tympanic membrane. For proper differentiation of otorrhea episodes from AOM episodes we defined otorrhea as mucous or mucopurulent discharge from the ear with no symptoms of acute inflammation.	.	fluoroplastic Donaldson grommets (Micromedics, Inc.)
Popova 2010 20399511 2007-2009 Bulgaria	Myringotomy AND adenoidectomy	.	Diagnosis of AOM required the finding of middle ear effusion on otoscopy with at least one symptom, i.e., fever, earache or recent ear tugging, irritability and one sign of inflammation, i.e., erythema and/or white opacification of the tympanic	.	

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
			membrane, otorrhea from a perforation of a previously intact tympanic membrane. For proper differentiation of otorrhea episodes from AOM episodes we defined otorrhea as mucous or mucopurulent discharge from the ear with no symptoms of acute inflammation.		
Rach 1991 2070526 Netherlands	TT (Tympanostomy tubes)	.		silicone ventilating tubes, Donaldson design	.
Rach 1991 2070526 Netherlands	Control (unspecified intervention)	.			
Reiter 2009 19929085 Germany	palate cleft repair + TT (cleft palate or lip)	.			gold grommet
Reiter 2009 19929085 Germany	palate cleft repair (cleft palate or lip)	.			
Robson 1992 1431515 1976-1988 UK	TT (Tympanostomy tubes)	.			10 (26.3%) had long term ventilation tubes ('Goode tubes')
Robson 1992 1431515 1976-1988 UK	Control (conservative treatment)	.			
Rovers 2000 10969126 01/1996- 04/1997 Netherlands	TT (Tympanostomy tubes; some pts received andenoidectomy, equally distributed)	.			Bevel Bobbins, Entemed BV, The Netherlands; grommets
Rovers 2000 10969126 01/1996- 04/1997 Netherlands	Watchful waiting (no surgery; some pts received andenoidectomy, equally distributed)	.			
Schilder 1997 9372253	TT	.			

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
09/1982-08/1983 Netherlands					
Schilder 1997 9372253 09/1982-08/1983 Netherlands	control (no TT)	.			
Stenstrom 2005 16330739 1985-1989 Canada	TT (Tympanostomy tubes)	.			50 (83%) of 60 patients received T-type VTs
Stenstrom 2005 16330739 1985-1989 Canada	Control (medical treatment (low-dose sulfisoxazole for 6 months)	.			
Veletic 2011 21397957 2004-2009 Croatia	TT AND adenoidectomy	.			
Veletic 2011 21397957 2004-2009 Croatia	Adenoidectomy (Adenoidectomy only)	.			
Vlastos 2011 21205368 5/2007-5/2008 Greece	TT AND adenoidectomy	.			Shepard type
Vlastos 2011 21205368 5/2007-5/2008 Greece	Myringotomy AND adenoidectomy	.			
Wolter 2012 22883987 1991-2009 Canada	TT (Tympanostomy tubes)	.			
Wolter 2012	Treated medically (periodic antibiotics or	.			

Study	Arm (Description)	Antibiotic name, dose, duration	Diagnostic criteria for AOM	Management of acute infections	Tube type
22883987 1991-2009 Canada	hearing aids)				
Xu 2003 12930655 09/1997- 05/2000 China	palate cleft repair (cleft palate or lip)	.			
Xu 2003 12930655 09/1997- 05/2000 China	palate cleft repair + TT (cleft palate or lip)	.			
Yagi 1977 321716 Sudan	Adenoidectomy (Adenoidectomy only)	.			
Yagi 1977 321716 Sudan	TT AND myringotomy AND adenoidectomy	.			
Yousaf 2012 23855103 6/2008- 12/2011 Pakistan	TT (Tympanostomy tubes)	10 d.			
Yousaf 2012 23855103 6/2008- 12/2011 Pakistan	Myringotomy (Myringotomy only)	10 d.			
Youssef 2013 24265883 03/2007- 01/2009 Egypt	TT + myringotomy +/- adenoidectomy	.			
Youssef 2013 24265883 03/2007- 01/2009 Egypt	Laser myringotomy +/- adenoidectomy	.			

Key Question 2 Arm Details

Study	Arm (description)	Tube type
Casselbrant 1992 1565551 3/1981-1/1988 U.S.	prophylaxis (Amoxacillin)	

Study	Arm (description)	Tube type
Casselbrant 1992 1565551 3/1981-1/1988 U.S.	Tympanostomy tubes	Teflon Armstrong-type
El-Sayed 1996 Saudi Arabia	prophylaxis (sulfamethoxazole and trimethoprim)	.
El-Sayed 1996 Saudi Arabia	Tympanostomy tubes	
Gonzalez 1986 3537596 1/1982-2/1983-12/1983-11/1985 U.S.	prophylaxis (sulfisoxazole)	.
Gonzalez 1986 3537596 1/1982-2/1983-12/1983-11/1985 U.S.	Tympanostomy tubes	Paparella
Gonzalez 1986 3537596 1/1982-2/1983-12/1983-11/1985 U.S.	no treatment	
Kujala 2012 22466327, 24445832 3/2002-6/2004 Finland	Tympanostomy tubes	Donaldson Silicone tubes
Kujala 2012 22466327, 24445832 3/2002-6/2004 Finland	TT AND adenoidectomy	Donaldson Silicone tubes
Kujala 2012 22466327, 24445832 3/2002-6/2004 Finland	no_treatment	
Mattila 2003 12578443 RCT 1996-1999 Finland	TT AND adenoidectomy	
Mattila 2003 12578443 RCT 1996-1999 Finland	Tympanostomy tubes	
Mattila 2003 12578443 NRCS 1996-1999 Finland	TT AND adenoidectomy	
Mattila 2003 12578443 NRCS 1996-1999 Finland	Tympanostomy tubes	
Grindler 2014 24627408 1/2009-2/2012 U.S.	Tympanostomy tubes	
Grindler 2014 24627408 1/2009-2/2012 U.S.	control	

Key Question 4 Arm Details

Study	Arm	Comments/Notes about interventions
Goldstein 2005 15689760 7/1996-6/1999 U.S.	ear plugs	a soft, plastic, prefabricated ear plug (Doc's Proplugs, International Aquatic Trades, Inc., Santa Cruz, CA) or, if their ear canals were too small, with a moldable silicone ear plug (Insta-Putty, Insta-Mold Products, Inc., Oaks, PA).
Goldstein 2005 15689760 7/1996-6/1999 U.S.	no ear plugs	
Parker 1993 8024107 12/1989-2/1991 U.S.	swimming	patients were allowed to swim and bathe without precautions
Parker 1993 8024107 12/1989-2/1991 U.S.	nonswimming	patients were instructed not to swim or submerge their heads while bathing
Becker 1987 3586818 4/1985-9/1985 U.S.	ear plugs	Silicon putty ear plugs: no restrictions on frequency, duration, location or type of swimming
Becker 1987 3586818 4/1985-9/1985 U.S.	no ear plugs	no restrictions on frequency, duration, location or type of swimming
Becker 1987 3586818 4/1985-9/1985 U.S.	nonswimming	custom-fitted molded ear plugs

Study	Arm	Comments/Notes about interventions
Cohen 1994 8289048 1990-1992 Israel	swimming	participated in swimming 4-6 times a week; in chlorinated pool water or seawater without restrictions; swimming season lasted April through September; duration of swimming was 1/2-2 hours/day; mandatory use of neomycin-polymyxin-hydrocortizone eardrops at bedtime on the day that the child had been swimming.
Cohen 1994 8289048 1990-1992 Israel	nonswimming	
el Silimy 1986 3780019 UK	swimming	children swam with ears unprotected on average once every 2 weeks for an average of three-quarters of an hour. This swimming was in Council indoor heated swimming pools
el Silimy 1986 3780019 UK	nonswimming	
Kaufmann 1999 10546304 1/1996-1/1997 Switzerland	ear plugs	ear plugs, bathing caps, and/or water-absorbent padding
Kaufmann 1999 10546304 1/1996-1/1997 Switzerland	no precautions	
Salata 1996 8607955 U.S.	no precautions	children who were allowed to swim without ear protection or postexposure medication
Salata 1996 8607955 U.S.	ear drops	children who were allowed to swim without any ear protection (on days when they were exposed to water, their parents were to instill three drops of a suspension that contained polymyxin B sulfate, neomycin sulfate, and hydrocortisone into each ear before bedtime)
Salata 1996 8607955 U.S.	ear plugs	children who were fitted with prefabricated ear molds and instructed to use the ear molds whenever they were swimming
Salata 1996 8607955 U.S.	nonswimming	children who were assigned to groups 1 through 3 but never actually went swimming during the study period
Smelt 1984 6538215 UK	swimming	surface swimming in a clean, chlorinated, outdoor swimming pool without earplugs or other ear protection. The patients spent about 1 hour swimming in the pool, and diving was prohibited during swimming
Smelt 1984 6538215 UK	nonswimming	
Smelt 1984 6538215 UK	swimming	Parent-reported swimming
Smelt 1984 6538215 UK	nonswimming	

Key Question 5 Arm Details

Study	Arm	Antibiotic name, dose
van Dongen 2014 24552319 25896832 6/2009-5/2012 Netherlands	antibiotic-glucocorticoid drops	bacicoline-B, five drops, tid, 7 days
van Dongen 2014 24552319 25896832 6/2009-5/2012 Netherlands	oral antibiotic	amoxicillin– clavulanate suspension, 30 mg of amoxicillin and 7.5 mg of clavulanate per kilogram of body weight, 7 days
Goldblatt 1998 10190709 U.S.	antibiotic drop	ofloxacin, 40 mg/kg, 10 days
Goldblatt 1998 10190709 U.S.	oral antibiotic	amoxicillin/cavulanate, 0.25 ml, 10 days
Heslop 2010 20979100 5/2003-5/2007 Chile	antibiotic drop	ciprofloxacin, 3 mg/mL twice daily, 1 week

Study	Arm	Antibiotic name, dose
Heslop 2010 20979100 5/2003-5/2007 Chile	oral antibiotic	amoxicillin, 25 to 50 mg/kg/d divided into three daily doses, 1 week
Heslop 2010 20979100 5/2003-5/2007 Chile	Saline	
Ruohola 1999 10190921 03/1996-05/1997 Denmark	oral antibiotics and glucosteroids	amoxicillin, clavulanate potassium, 40 mg/kg/d, 10 mg/kg/d*2, 7 days
Ruohola 1999 10190921 03/1996-05/1997 Denmark	oral antibiotics and placebo	amoxicillin, clavulanate potassium, 40 mg/kg/d, 10 mg/kg/d*2, 7 days
Ruohola 2003 12728089 09/1998-06/1999 Finland	oral antibiotic	amoxicillin-clavulanate, 45 mg/kg/d, 6.4 mg/kg/d, 7 days
Ruohola 2003 12728089 09/1998-06/1999 Finland	oral placebo	7 days
Dohar 1999 10326811 U.S.	antibiotic drop	Ofloxacin, 0.25 ml twice daily, 10 days
Dohar 1999 10326811 U.S.	historic controls	at the discretion of the treating physician (not Ofloxacin), ,
Dohar 1999 10326811 U.S.	current usual treatment	at the discretion of the treating physician (not Ofloxacin), ,
Dohar 2006 16880248 5/2003-5/2004 U.S., Finland	antibiotic drop	Ciprodex Sterile Otic Suspension, 4 drops twice daily, 7 days
Dohar 2006 16880248 5/2003-5/2004 U.S., Finland	oral antibiotic	Augmentin ES-600, 90 mg/kg per day divided every 12 hours, 10 days
Granath 2008 18565598 -2/1998-12/2002 Sweden	antibiotic drop	hydrocortisone + oxytetracycline + polymyxine B, NR, 5-7 days
Granath 2008 18565598 -2/1998-12/2002 Sweden	antibiotic drop + oral antibiotic	hydrocortisone + oxytetracycline + polymyxine B; amoxicillin, NR, 5-7 days
Roland 2003 14660913 3/2000-2/2001 U.S.	antibiotic-glucocorticoid drops	Ciprofloxacin, ciprofloxacin 0.3% plus dexamethasone 0.1% otic suspension, 7 days
Roland 2003 14660913 3/2000-2/2001 U.S.	antibiotic drop	Ciprofloxacin, ciprofloxacin 0.3% ophthalmic solution, 7 days
Roland 2004 14702493 U.S.	antibiotic-glucocorticoid drops	Ciprofloxacin/Dexamethasone, 4 drops twice daily, 7 days
Roland 2004 14702493 U.S.	antibiotic drop	Ofloxacin, 5 drops twice daily, 10 days
Strachan 2000 10865480 UK	antibiotic-glucocorticoid drops	Otosporin, 3 drops, three times a day, 7-14 days
Strachan 2000 10865480 UK	antibiotic-glucocorticoid spray	Stomize, 1 metered dose, three times a day, 7-10
Waycaster 2004 no PMID U.S.	antibiotic-glucocorticoid drops	Ciprodex, 4 drops twice daily, 7 days
Waycaster 2004 no PMID U.S.	antibiotic drop	Floxin, 5 drops twice daily, 10 days

Appendix E. Baseline Characteristics

Key Question 1 Baselines

Study	Arm	Age (y), mean (range)	Age of onset (y)	Average hearing level mean (SD)	No. of siblings mean (SD)	No. of OME episodes mean	Hearing loss mean	Male gender n/N (%)	Poverty/low SES n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)
Augustsson 2006 16214225	TT							61/61 (100)			
Augustsson 2006 16214225	Control							173/173 (100)			
Bernard 1991 1861918	Myringotomy+TT	4.7		30.7		2.9		34/60 (56.7)			
Bernard 1991 1861919	Antibiotic prophylaxis	5		29.6		3.0		34/65 (52.3)			
Casselbrant 2009 19819564	Myringotomy+TT	[2, 3.9]						19/32 (59.4)			
Casselbrant 2009 19819565	TT AND myringotomy AND adenoidectomy	[2, 3.9]						24/32 (75.0)			
Casselbrant 2009 19819566	Myringotomy AND adenoidectomy	[2, 3.9]						22/34 (64.7)			
Chaudhuri 2006 23120310	Total	[0, 12]									
Coyte 2001 11309633	TT	Median: 2 [IQR 1, 5]						16296/26714 (61)			
Coyte 2001 11309634	TT AND adenoidectomy	Median: 4 [IQR 3, 6]						2475/4125 (60)			
D'Eredità 2006 16406076	TT	3.6									
D'Eredità 2006 16406076	Myringotomy	3.8									
Gates 1989 2492179	Myringotomy		2.3		0.43 (with otitis media)			65/107 (61)	52/107 (49)		
Gates 1989 2492180	Myringotomy+TT		2.2		0.48 (with otitis media)			75/129 (58)	70/129 (54)		
Gates 1989 2492181	Myringotomy AND adenoidectomy		2.3		0.46 (with			77/130 (59)	73/130 (56)		

Study	Arm	Age (y), mean (range)	Age of onset (y)	Average hearing level mean (SD)	No. of siblings mean (SD)	No. of OME episodes mean	Hearing loss mean	Male gender n/N (%)	Poverty/low SES n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)
					otitis media)						
Gates 1989 2492182	TT AND myringotomy AND adenoidectomy		2.3		0.49 (with otitis media)			73/125 (58)	63/125 (50)		
Gates 1988 3336263	Total	[4, 8]									
Gates 1988 3336267	TT AND myringotomy AND adenoidectomy										
Gates 1987 3683478	Myringotomy	69% 4.0-6.5	2.3					65/107 (61)	52/107 (49)		
Gates 1987 3683479	TT	69% 4.0-6.5	2.2					75/129 (58)	70/129 (54)		
Gates 1987 3683480	Myringotomy AND adenoidectomy	73% 4.0-6.5	2.3					77/130 (59)	73/130 (56)		
Gates 1987 3683481	TT AND adenoidectomy	74% 4.0-6.5	2.3					73/125 (58)	63/125 (50)		
Gates 1985 4040338	TT										
Gates 1985 4040339	Myringotomy										
Grievink 1993 8246466	Control	7.75 (2)						80/151 (53%)			
Grievink 1993 8246466	TT	-1.9						23/37 (62.2%)			
Hall 2009 19260880	Total	3 [1.25, 4.67]									
Hall 2009 19260881	Early TT							49/88 (56)			
Hall 2009 19260882	Watchful waiting							44/74 (59)			
Hammarén-Malmi 2006	TT	[1, 4]			1.0 (0.9)			56/96 (58.3)		48/96 (50.0)	
Hammarén-Malmi 2007	TT AND adenoidectomy	[1, 4]			1.1 (1.0)			51/102 (50.0)		56/102 (54.9)	
Hubbard 1985 4039792	Early TT										
Hubbard 1985 4039793	Late TT										
Kadhim 2007 17279052	TT (Tympanostomy tubes)										
Kadhim 2007	TT AND										

Study	Arm	Age (y), mean (range)	Age of onset (y)	Average hearing level mean (SD)	No. of siblings mean (SD)	No. of OME episodes mean	Hearing loss mean	Male gender n/N (%)	Poverty/low SES n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)
17279052	adenoidectomy										
Kobayashi 2012 22386275	TT										
Kobayashi 2012 22386276	Control										
Kremer 1979 456299	Total	[0, >7]						152/243 (62.4)			
Mandel 1992 1565550	Watchful waiting	[0.58, 12]						22/35 (62.9)	16/33 (48.5)		
Mandel 1992 1565550	Myringotomy	[0.58, 12]						25/39 (64.1)	22/36 (61.1)		
Mandel 1992 1565550	Myringotomy+TT	[0.58, 12]						27/37 (73.0)	14/35 (40.0)		
Mandel 1989 2789777a	Control	[0.58, 12]						22/29 (75.9)	11/29 (37.9)		
Mandel 1989 2789777a	Myringotomy	[0.58, 12]						12/27 (44.4)	6/27 (22.2)		
Mandel 1989 2789777a	Myringotomy+TT	[0.58, 12]						20/30 (66.7)	11/30 (36.7)		
Mandel 1989 2789777b	Myringotomy	[0.58, 12]						10/12 (83.3)	2/12 (16.7)		
Mandel 1989 2789777b	Myringotomy+TT	[0.58, 12]						9/11 (81.8)	1/11 (9.1)		
Marshak 1980 6778336	Total	[0, 8]									
Maw 1999 10459904	TT	2.96 (0.84) [1.17, 4.62]			13% 1, 47% 2, 30% >=3					40/88 (47)	
Maw 1999 10459904	Watchful waiting	2.93 (0.87) [1.31, 4.69]			17% 1, 39% 2, 44% >=3					35/72 (49)	
Motta 2006 17465378	Total	66% <6 [2, 11]						114/193 (59)			
MRC Multicenter Otitis Media Study Group 2004 15373863	TT + myringotomy +/- adenoidectomy	5.2 (0.76)		32.2 (5.8)				16/32 (50.0)			
MRC Multicenter Otitis Media Study Group 2004 15373863	Control	5.0 (0.75)		31.3 (6.8)				12/36 (33.3)			

Study	Arm	Age (y), mean (range)	Age of onset (y)	Average hearing level mean (SD)	No. of siblings mean (SD)	No. of OME episodes mean	Hearing loss mean	Male gender n/N (%)	Poverty/low SES n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)
MRC Multicentre Otitis Media Study Group 2012 22443163	TT AND adenoidectomy	5.4 (0.86)		31.7 (6.4)			Mean reported hearing difficulty – RHD (sd) 14.0 (4.2)	61/128 (48)	81/125 (65)	46/115 (40)	120/120 (100)
MRC Multicentre Otitis Media Study Group 2012 22443163	TT	5.2 (0.85)		32.2 (6.0)			Mean reported hearing difficulty – RHD (sd) 14.4 (4.1)	60/126 (48)	84/126 (67)	35/110 (32)	121/123 (98)
MRC Multicentre Otitis Media Study Group 2012 22443163	Watchful waiting	5.2 (0.87)		33.5 (6.4)			Mean reported hearing difficulty – RHD (sd) 13.6 (4.5)	62/122 (51)	82/122 (67)	29/101 (29)	110/110 (100)
Navarro 1997 9382253	TT	[2, 4]									
Navarro 1997 9382253	Control	[2, 4]									
Nguyen 2004 15126745	TT	3.4 [1.5, 9.5]						24/40 (60)			
Nguyen 2004 15126745	TT AND adenoidectomy	4.5 [1.5, 9.5]						13/23 (57)			
Paradise 2001 11309632	Early TT		39.7% 1, 46.1% 2, 14.2% 3					115/204 (56.4)			
Paradise 2001 11309632	Late TT		40.9% 1, 47.7% 2, 11.4%					112/193 (58.0)			

Study	Arm	Age (y), mean (range)	Age of onset (y)	Average hearing level mean (SD)	No. of siblings mean (SD)	No. of OME episodes mean	Hearing loss mean	Male gender n/N (%)	Poverty/low SES n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)
			3								
Peters 1994 8195687	Control	7.75 (2)						80/151 (53)			
Peters 1994 8195687	TT	7.75 (1.9)						23/37 (62.2)			
Popova 2010 20399511	TT AND myringotomy AND adenoidectomy	5 (1) [3.5, 7.2]						22/42 (52.4)		19/42 (45)	40/42 (95)
Popova 2010 20399511	Myringotomy AND adenoidectomy	5.1 (3.8, 6.3)						20/36 (55.6)		31/36 (86)	36/36 (100)
Rach 1991 2070526	TT	[2, 4]									
Rach 1991 2070526	Control	[2, 4]									
Reiter 2009 19929085	Total	8.5 (2.2) [0, 14]						28/53 (52.8)			
Robson 1992 1431515	TT	6.3 [2, 13]						22/38 (57.9)			
Robson 1992 1431515	Control	5.2 [0.5, 12]						14/32 (43.8)			
Rovers 2000 10969126	Total	1.62 (1.3)	0.75	44.9 (0.82) best ear				110/187 (58.8)			49/187 (26.1)
Rovers 2000 10969126	TT	1.625 (1.7)	0.75	46.4 (1.1) best ear [IQR 44.2, 48.6]				55/93 (59.1)			
Rovers 2000 10969126	Watchful waiting	1.62 (1.9)	0.75	43.4 (1.2) best ear [IQR 41.0, 45.8]				55/94 (58.5)			
Stenstrom 2005 16330739	Control	12.3 (3.8) [8, 16]				3.1 (1.6)	Mean hearing loss at entry into RCT, PTA at 0.5, 1, 2, 4 kHz: mean: 33.4, sd: 11.9	14/27 (52)		14/27 (52)	15/27 (56)
Stenstrom 2005 16330739	TT	11.6 (4.3) [8, 16]				1.9 (1.8)	Mean hearing loss at entry into RCT, PTA at 0.5, 1, 2, 4 kHz: mean: 28.7, sd: 13	23/38 (60)		16/38 (42)	25/38 (66)

Study	Arm	Age (y), mean (range)	Age of onset (y)	Average hearing level mean (SD)	No. of siblings mean (SD)	No. of OME episodes mean	Hearing loss mean	Male gender n/N (%)	Poverty/low SES n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)
Vealepic 2011 21397957	TT AND adenoidectomy	5.56									
Vealepic 2011 21397957	Adenoidectomy	5.44									
Vlastos 2011 21205368	TT AND adenoidectomy	4.6 (1.1) [3, 7]		31.2 (3.9) [21, 39]				14/25 (56)			
Vlastos 2011 21205368	Myringotomy AND adenoidectomy	4.4 (1.1) [3, 7]		32.7 (0.72) [27, 37]				15/27 (56)			
Wolter 2012 22883987	Total	Median: 6 [0.7, 17]	Median : 5.74								
Xu 2003 12930655	palate cleft repair			43.9							
Xu 2003 12930655	palate cleft repair + TT	4.8 [0.5, 10]		35.9							
Yagi 1977 321716	Total	Median: 6 [3, 12]		100% >20dB							
Yousaf 2012 23855103	Total	[2, 8]						38/62 (61.3)			
Youssef 2013 24265883	Total	7.4 (2.0)						44/86 (51.1)			
Youssef 2013 24265883	TT + myringotomy +/- adenoidectomy	7.8 (1.5)									
Youssef 2013 24265883	Laser myringotomy +/- adenoidectomy	6.9 (2.3)									
Schilder 1997 9372253	TT	[2,4]		14.0 (12.8)				7/13 (53.8)			
Schilder 1997 9372253	control (no TT)	[2,4]		8.4 (7.7)				8/14 (57.1)			

Key Question 2 Baselines

Study	Arm	Age (y), mean (range)	No. of OME episodes, mean	Males n/N (%)	In daycare n/N (%)
Casselbrant 1992 1565551	Antibiotic prophylaxis (amoxicillin)	43.3% 0.58-1.25, 40.0% 1.33-2.08, 16.7% 2.17-3*			
Casselbrant 1992 1565551	Placebo	43.2% 0.58-1.25, 37.5% 1.33-2.08, 19.3% 2.17-3*			

Study	Arm	Age (y), mean (range)	No. of OME episodes, mean	Males n/N (%)	In daycare n/N (%)
Casselbrant 1992 1565551	TT	45.3% 0.58-1.25, 34.9% 1.33-2.08, 19.8% 2.17-3*			
El-Sayed 1996	TT	1.66		17/31 (48.6)	
El-Sayed 1996	Antibiotic prophylaxis (sulfamethoxazole and trimethoprim)	1.64			
Gonzalez 1986 3537596	TT	1.68			
Gonzalez 1986 3537596	Antibiotic prophylaxis (sulfisoxazole)	1.55			
Gonzalez 1986 3537596	Placebo	1.39			
Grindler 2014 24627408	Total	1.23 (0.38)		652/1208 (54.0)	603/1006 (61.2)
Kujala 2012 22466327, 24445832	TT	1.34 (0.33)	6.7	36/100 (36)	
Kujala 2012 22466327, 24445832	TT + adenoidectomy	1.48 (0.36)	6.3	41/100 (41)	
Kujala 2012 22466327, 24445832	Control	1.33 (0.32)	6.4	48/100 (48)	
Mattila 2003 12578443 RCT	Total	1.42	3.5	86/137 (62.8)	35/137 (25.5)
Mattila 2003 12578443 RCT	TT + adenoidectomy	1.39	3.5	47/74 (64)	17/74 (22)
Mattila 2003 12578443 RCT	TT	1.45	3.4	39/63 (62)	18/63 (27)
Mattila 2003 12578443 RCT	Total	1.45	3.5	91/169 (53.8)	43/169 (25.4)
Mattila 2003 12578443 RCT	TT + adenoidectomy	1.46	3.5	64/124 (52)	31/124 (25)
Mattila 2003 12578443 RCT	TT	1.44	3.5	27/45 (60)	12/45 (27)

* age given only in % in certain ranges

Key Question 4 Baselines

Study	Arm	Age (y), mean (range)	Males n/N (%)	Hx of adenoidectomy n/N (%)	Hx of tonsilectomy n/N (%)	Other
Goldstein 2005 15689760	ear plugs	79%≤3 (0.5, 6)*	59/103 (57)	24/103 (23)		
Goldstein 2005 15689760	no ear plugs	81%≤3 (0.5, 6)*	60/98 (61)	24/98 (24)		
Parker 1993 8024107	nonswimming	3.1 (0.58, 9)				

Study	Arm	Age (y), mean (range)	Males n/N (%)	Hx of adenoidectomy n/N (%)	Hx of tonsilectomy n/N (%)	Other
Parker 1993 8024107	swimming	3.1 (0.25, 8)				
Becker 1987 3586818	nonswimming	4.9 (1, 14)	24/30			Sheehy Teflon collar button tubes
Becker 1987 3586819	ear plugs	6.3 (2, 14)	17/23 (17)			Sheehy Teflon collar button tubes
Becker 1987 3586820	no ear plugs	5,9 (1.5, 13)	10/32 (31)			Sheehy Teflon collar button tubes
Cohen 1994 8289048	nonswimming	(3, 12)	11/20 (55)			
Cohen 1994 8289049	swimming	(3, 12)	12/22 (54.5)			
el Silimy 1986 3780019	nonswimming	7 (4, 14)	24/41 (58.5)	18/41 (43.9)	7/41 (17.1)	16/41 (39%) bilateral grommets
el Silimy 1986 3780019	swimming	7 (4, 14)	25/45 (55.6)	20/45 (44.4)	7/45 (15.6)	18/45 (40%) bilateral grommets
Kaufmann 1999 10546304	Total			15/86 (18)	17/86 (20)	
Kaufmann 1999 10546305	no precautions	5.3 (1.2, 15.6)	30/47 (63)			
Kaufmann 1999 10546306	ear plugs	5.8 (1.3, 12.3)	11/16 (67)			
Salata 1996 8607955	Total	2.67 (0.5, 12)	238/399 (59.6)	80/399 (20)		
Salata 1996 8607956	no precautions					
Salata 1996 8607957	ear drops					
Salata 1996 8607958	ear plugs					
Salata 1996 8607959	nonswimming					
Smelt 1984 6538215	Total					39 had grommet resinsertions
Smelt 1984 6538215	swimming					
Wang 2009 19251534	Total	(5, 14)	9/14 (64.3)	7/14 (50)		2 had grommet resinsertions

* age given only in % below/above 3 years

Key Question 5 Baselines

Study	Arm	Age (y), mean (SD) [range]	No. of previous episodes of otorrhea, mean (range)	Males n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)	Bilateral otorrhea n/N (%)
van Dongen 2014 24552319 25896833	antibiotic-glucocorticoid drops	4.6 (2.1)	(0, 5)	76/50 (66)	76/13 (17)	32/29 (91)	76/14 (18)
van Dongen 2014 24552319 25896834	oral antibiotic	4.4 (2.0)	(0, 5)	77/40 (52)	77/4 (5)	33/27 (82)	77/11 (14)

Study	Arm	Age (y), mean (SD) [range]	No. of previous episodes of otorrhea, mean (range)	Males n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)	Bilateral otorrhea n/N (%)
van Dongen 2014 24552319 25896835	watchful waiting	4.4 (2.0)	(0, 3)	77/43 (56)	77/9 (12)	31/25 (81)	77/13 (17)
Goldblatt 1998 10190709	antibiotic drop	3.7 (2.46)					
Goldblatt 1998 10190709	oral antibiotic	3.5 (2.62, p=0.521)					
Heslop 2010 20979100	Saline	2 [11, 63]					
Heslop 2010 20979101	antibiotic drop	1.83 [7, 45]					
Heslop 2010 20979102	oral antibiotic	1.67 [10, 108]					
Ruohola 1999 10190921	oral antibiotics and glucosteroids	[1.0,10.0]		23/14 (61)			
Ruohola 1999 10190921	oral antibiotics and placebo	[1.0,5.8]		27/14 (52)			
Ruohola 2003 12728089	oral antibiotic	2.25 (1.08)	3.5 (IQR 3, 4.25)	34/24 (71)	34/19 (56)	34/22 (65)	
Ruohola 2003 12728089	oral placebo	1.75 (0.92)	3 (IQR 2, 4)	32/20 (63)	32/16 (50)	32/18 (56)	
Dohar 1999 10326811	antibiotic drop	3.6 (2.7)		143/89 (62)			
Dohar 1999 10326811	historic controls	3.6 (2.5)		309/175 (57)			
Dohar 1999 10326811	current usual treatment	3.7 (2.5)		68/45 (67)			
Dohar 2006 16880248	antibiotic drop	59% <2*		39/20 (51)			39/5 (13)
Dohar 2006 16880248	oral antibiotic	56% <2*		41/22 (54)			41/11 (27)
Granath 2008 18565598	antibiotic drop	median 1.58 [10,35]		24/15 (1.6)			
Granath 2008 18565598	antibiotic drop + oral antibiotic	median 1.58 [9,36]		26/12 (2.17)			
Roland 2003 14660913	antibiotic-glucocorticoid drops	2.57 (2.54) [0, 12]		87/46 (52.9)			87/22 (25.3)
Roland 2003 14660913	antibiotic drop	2.26 (2.21) [0, 11]		80/41 (51.3)			80/14 (17.5)
Roland 2004 14702493	antibiotic-glucocorticoid drops	49.2%<2, 49.8% 2-11, 1.0% >11*		297/172 (57.9)			
Roland 2004 14702493	antibiotic drop	49.0%<2, 51.0% 2-11*		302/201 (66.6)			
Strachan 2000 10865480	antibiotic-glucocorticoid drops	7.3 [2,25]					
Strachan 2000 10865480	antibiotic-glucocorticoid spray						
Waycaster 2004 no PMID	antibiotic-glucocorticoid drops	2.77 (2.53) [95%CI 2.43, 3.10]		125/221 (57)			

Study	Arm	Age (y), mean (SD) [range]	No. of previous episodes of otorrhea, mean (range)	Males n/N (%)	Cigarette smoke exposure n/N (%)	Daycare n/N (%)	Bilateral otorrhea n/N (%)
Waycaster 2004 no PMID	antibiotic drop	2.68 (2.42) [95%CI 2.35, 3.00]		136/208 (65)			

* age given only in % below/above threshold

Appendix F. Risk of Bias

Risk of Bias, RCTs

Study	Random sequence generation	Allocation concealment	Blinding of participants	Blinding of personnel/care providers	Blinding of outcome assessor	Incomplete outcome data	Selective Reporting	Intention-to-treat-analysis	Group similarity at baseline	Co-interventions	Compliance	Timing of outcome assessments	Additional Bias
KQ1													
MRC Multicenter Otitis Media Study Group 2004 15373863	No	High	High	High	Unclear	High	Unclear	High	Unclear	Unclear	Unclear	Low	Low
MRC Multicenter Otitis Media Study Group 2012 22443163	No	Unclear	High	High	High	Low	Unclear	High	Low	Unclear	High	Low	Low
Vlastos 2011 21205368	No	Unclear	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low
Augustsson 2006	No Data	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
Gates 1985 4040338	No Data	Unclear	High	Unclear	Unclear	High	Low	High	Unclear	Low	Low	Low	Low
Maw 1999 10459904	No Data	High	High	Low	Low	High	Low	Low	Low	Unclear	High	Low	Low
Hall 2009 19260880	Unclear	Unclear	Unclear	Unclear	Unclear	High	Low	Low	Low	Low	Low	Low	Low
Bernard 1991 1861917	Unsure	Unclear	High	High	High	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low
Casselbrant 2009 19819563	Unsure	Unclear	High	High	Unclear	High	Unclear	Low	Unclear	Unclear	Unclear	Low	Low
Chaudhuri 2006 23120310	Unsure	Unclear	High	High	High	Low	Low	Low	Unclear	Unclear	Low	Low	Low
D'Eredita 2006 16406076	Unsure	Unclear	High	High	High	Low	High	Low	Unclear	Low	Low	Low	Low
Gates 1988 3336263	Unsure	Unclear	Unclear	Unclear	Unclear	Unclear	Low	High	Low	Low	Low	Low	Low
Hammarén-Malmi 2005 15995051	Unsure	Unclear	Unclear	Unclear	Unclear	Low	Unclear	Low	Unclear	Unclear	Unclear	Low	Low
Mandel 1989 2789777a	Unsure	Unclear	High	High	Unclear	Unclear	Unclear	High	Unclear	Unclear	Unclear	Unclear	Low
Mandel 1989	Unsure	Unclear	High	High	Unclear	Unclear	Unclear	High	Unclear	Unclear	Unclear	Unclear	Low

Study	Random sequence generation	Allocation concealment	Blinding of participants	Blinding of personnel/care providers	Blinding of outcome assessor	Incomplete outcome data	Selective Reporting	Intention-to-treat analysis	Group similarity at baseline	Co-interventions	Compliance	Timing of outcome assessments	Additional Bias
2789777b							ar						
Mandel 1992 1565550	Unsure	Unclear	High	High	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low
Nguyen 2004 15126745	Unsure	Unclear	Unclear	Unclear	Unclear	Low	Unclear	Low	Unclear	Unclear	Unclear	Unclear	Low
Popova 2010 20399511	Unsure	Unclear	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low
Rach 1991 2070526	Unsure	Unclear	High	High	High	Low	Unclear	Low	Unclear	Unclear	Unclear	Low	Low
Rovers 2000 10969126	Unsure	Unclear	High	High	Unclear	Low	Unclear	Low	Low	Low	Unclear	Low	Low
Gates 1987 3683478	Yes	Low	High	High	Low	Low	Low	Low	Low	Unclear	Low	Low	Low
Paradise 2001 11309632	Yes	Low	High	High	High	Low	Low	Low	Low	Unclear	High	Low	Low
Gates 1989 2492178	Yes	High	High	High	Unclear	Unclear	Low	Unclear	Low	Unclear	Unclear	Low	Low
KQ2													
Casselbrant 1992 1565551	Unclear	High	Low	High	High	High	Low	Low	Low	Low	Low	Unclear	Low
Gonzalez 1986 3537596	Unclear	Unclear	High	High	High	Unclear	Unclear	Unclear	Unclear	High	Unclear	Low	Low
Kujala 2012 22466327, 24445832	Low	Low	High	High	High	Low	Low	Low	Low	Low	Low	Low	Low
Mattila 2003 12578443	Unclear	Unclear	High	Unclear	Unclear	Low	Unclear	High	High	High	Unclear	Unclear	Low
El-Sayed 1996	Unclear	Unclear	High	High	High	Low	Unclear	Low	Unclear	Low	Low	Low	Low
KQ4													
Goldstein 2005 15689760	Low	High	High	Unclear	Low	Low	Low	Low	Unclear	Low	Low	Low	Low
Parker 1993 8024107	Low	Unclear	High	Unclear	Unclear	High	Unclear	High	Unclear	Unclear	High	Unclear	Low
KQ5													
van Dongen 2014 24552319 25896832	No	Low	High	High	Low	Low	Low	Low	Low	Unclear	Low	Low	Low
Goldblatt 1998	Low	High	Low	High	High	Low	Low	Low	Low	Low	Low	Low	Low

Study	Random sequence generation	Allocation concealment	Blinding of participants	Blinding of personnel/care providers	Blinding of outcome assessor	Incomplete outcome data	Selective Reporting	Intention-to-treat-analysis	Group similarity at baseline	Co-interventions	Compliance	Timing of outcome assessments	Additional Bias
10190709													
Heslop 2010 20979100	Yes	Low	Low	Low	Low	Unclear	Low	Low	Low	Low	Low	Low	Low
Ruohola 1999 10190921	Low	Unclear	Low	Unclear	Unclear	High	High	High	Unclear	Low	Low	Low	Low
Ruohola 2003 12728089	Low	Unclear	Low	Unclear	Unclear	Low	Unclear	Low	High	Low	Low	Unclear	Low
Dohar 2006 16880248	Low	Low	High	High	Low	Low	Low	Low	Low	Low	Low	Low	Low
Granath 2008 18565598	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Roland 2003 14660913	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low
Roland 2004 14702493	Unclear	Unclear	High	High	Low	High	Low	Low	Low	Low	Low	Low	Low
Waycaster 2004	Unclear	Unclear	High	High	Low	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Low

Risk of Bias, NRCS

Study	Is the case definition adequate?	Representativeness of the cases	Selection of Controls	Definition of Controls	Ascertainment of Exposure	Same method of ascertainment for cases and controls	Non-Response rate	Allocation concealment	Dropout rate <20 percent	Blinded patient	Blinded outcome assessment	ITT	App. statistical analysis	If multicenter, was this accounted for in analysis?	Were potential confounders properly accounted for?	Clear reporting with no discrepancies	Were eligibility criteria clear?	Was selection bias likely?	Were interventions adequately described?	Were the outcomes fully defined?	Did the analyses account for compliance?
KQ1																					
Coyle 2001 11309633	Yes	Potential for selection biases or not stated	Hospital controls	ITT only	Written self report or medical record only	Yes*	Same rate for both group[s]	Na	No	Nd	Nd	Nd	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Na
Forquer 1982 6184891	Unsure	Potential for selection biases or not	Hospital controls]	No description of source	Written self report or medical record only	Yes*	Same rate for both group	Na	Yes	No	No	Nd	No	Na	No	No	Yes	Yes	No	No	Na

Study	Is the case definition adequate?	Representativeness of the cases	Selection of Controls	Definition of Controls	Ascertainment of Exposure	Same method of ascertainment for cases and controls	Non-Response rate	Allocation concealment	Dropout rate <20 percent	Blinded patient	Blinded outcome assessment	ITT	App. statistical analysis	If multicenter, was this accounted for in analysis?	Were potential confounders properly accounted for?	Clear reporting with no discrepancies	Were eligibility criteria clear?	Was selection bias likely?	Were interventions adequately described?	Were the outcomes fully defined?	Did the analyses account for compliance?
		stated					s														
Grievink 1993 8246466	Yes	Consecutive or obviously representative series of cases*	Community controls*	OME but no TT	Written self report or medical record only	Yes*	Rate different and no designation	Na	No	No	No	Nd	Yes	Na	Yes	Yes	Yes	Yes	Yes	Yes	No
Hubbard 1985 4039792	Unsure	Potential for selection biases or not stated	No description	No description of source	No description	Yes*	Same rate for both groups*	Na	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Kadhim 2007 17279052	No	Potential for selection biases or not stated	Hospital controls	TT	Written self report or medical record only	Yes*	Same rate for both groups	Na	No	No	No	No	Yes	Na	Yes	Yes	No	No	Yes	Yes	No
Kobayashi 2012 22386274	No	Potential for selection biases or not stated	Hospital controls	no TT	No description	unclear	Non respondents described	Na	Yes	No	Nd	Yes	No	Na	No	Yes	No	Yes	No	Yes	No
Kremer 1979 456299	No	Potential for selection biases or not stated	Hospital controls	no TT	No description	unclear	Non respondents described	Na	No	No	Nd	No	No	Na	No	No	No	Yes	Yes	Yes	No
Marshak 1980 6778336	Unsure	Potential for selection biases or not stated	No description	No description of source	No description	Yes*	Same rate for both groups*	No	No	No	No	Nd	Yes	Na	Nd	No	No	No	No	Yes	Yes
Motta 2006 17465378	Yes	Consecutive or obviously represent	Community controls*	No TT, otherwise same surgery	Secure record (eg surgical records)*	Yes*	NA						No	No	No	Yes	Yes	No	No	Yes	Na

Study	Is the case definition adequate?	Representativeness of the cases	Selection of Controls	Definition of Controls	Ascertainment of Exposure	Same method of ascertainment for cases and controls	Non-Response rate	Allocation concealment	Dropout rate <20 percent	Blinded patient	Blinded outcome assessment	ITT	App. statistical analysis	If multicenter, was this accounted for in analysis?	Were potential confounders properly accounted for?	Clear reporting with no discrepancies	Were eligibility criteria clear?	Was selection bias likely?	Were interventions adequately described?	Were the outcomes fully defined?	Did the analyses account for compliance?
		ative series of cases*	NOTES[Appropriate controls]																		
Navarro 1997 9382253	No	Potential for selection biases or not stated	No description	no TT	No description	unclear	Non respondents described	Na	No	No	Nd	No	No	unclear	No	Yes	No	Yes	No	No	No
Peters 1994 8195687	Yes	Consecutive or obviously representative series of cases*	Community controls*	OME but no TT	Written self report or medical record only	Yes*	Rate different and no designation	Na	No	No	No	Nd	Yes	Na	No	No	Yes	Yes	Yes	Yes	No
Reiter 2009 19929085	Yes	Potential for selection biases or not stated	Hospital controls	no TT	Secure record (eg surgical records)*	Yes*	Non respondents described	Na	Yes	No	Nd	Yes	No	Na	No	Yes	Yes	Yes	No	Yes	No
Robson 1992 1431515	Unsure	Potential for selection biases or not stated	Hospital controls	No tubes NOTES[Undergone surgery for cleft palate but did not have tubes inserted]	Written self report or medical record only NOTES[Cause notes]	Yes*	Same rate for both groups*	Na	Yes	No	No	Nd	Yes	Na	No	No	Yes	Yes	Yes	No	Na
Stenstrom 2005 16330739	Yes	Consecutive or obviously representative series of cases*	Hospital controls	medical treatment NOTES[underwent medical treatment but not surgery]	based off an RCT	Yes*	Same rate for both groups*	Nd	No	Nd	Nd	Yes	Yes	Na	Yes	Yes	Yes	No	Yes	No	No

Study	Is the case definition adequate?	Representativeness of the cases	Selection of Controls	Definition of Controls	Ascertainment of Exposure	Same method of ascertainment for cases and controls	Non-Response rate	Allocation concealment	Dropout rate <20 percent	Blinded patient	Blinded outcome assessment	ITT	App. statistical analysis	If multicenter, was this accounted for in analysis?	Were potential confounders properly accounted for?	Clear reporting with no discrepancies	Were eligibility criteria clear?	Was selection bias likely?	Were interventions adequately described?	Were the outcomes fully defined?	Did the analyses account for compliance?
				for VT insertion]																	
Veletic 2011 21397957	Yes	Consecutive or obviously representative series of cases*	NA	NA	NA	Yes*	Same rate for both groups*	Na	Yes	No	No	Nd	Yes	Na	Nd	Yes	Yes	No	Yes	Yes	Yes
Wolter 2012 22883987	No	Potential for selection biases or not stated	No description	No description of source	NA	Yes*	Same rate for both groups*	No	Yes	No	No	Nd	Yes	Na	Nd	No	No	No	No	Yes	Na
Xu 2003 12930655	No	Potential for selection biases or not stated	Hospital controls	no TT	NA	no description	Non respondents described	Na	unclear	No	Nd	Yes	No	Na	No	Yes	No	Yes	No	No	No
Yagi 1977 321716	Yes	Potential for selection biases or not stated	No description	No description of source	NA	Yes*	Same rate for both groups*	Na	Yes	No	No	Yes	Yes	Na	Nd	Yes	Yes	No	Yes	Yes	Na
Yousaf 2012 23855103	Yes	Potential for selection biases or not stated	No description	No description of source	NA	Yes*	Same rate for both groups*	Na	No	Nd	Nd	Yes	Yes	Na	Nd	Yes	Yes	No	No	Yes	Na
Youssef 2013 24265883	Unsure	Potential for selection biases or not stated	Hospital controls	no TT	NA	unclear	Non respondents described	Na	Yes	No	Nd	Yes	No	Na	No	Yes	No	Yes	No	Yes	No
Schilder 1997 9372253	Yes	Consecutive or obviously	No description	no TT	NA	unclear	unknown relative	Na	unclear	No	Nd	Yes	No	unclear	Yes	Yes	Yes	no	No	Yes	No

Study	Is the case definition adequate?	Representativeness of the cases	Selection of Controls	Definition of Controls	Ascertainment of Exposure	Same method of ascertainment for cases and controls	Non-Response rate	Allocation concealment	Dropout rate <20 percent	Blinded patient	Blinded outcome assessment	ITT	App. statistical analysis	If multicenter, was this accounted for in analysis?	Were potential confounders properly accounted for?	Clear reporting with no discrepancies	Were eligibility criteria clear?	Was selection bias likely?	Were interventions adequately described?	Were the outcomes fully defined?	Did the analyses account for compliance?
		representative series of cases*					non-response rate														
KQ2																					
Grindler 2014 24627408	No	Potential for selection biases or not stated	Hospital controls	no TT insertion	Secure record*)	Yes*	unknown relative non-response rate	Not Applicable	Not Applicable	Yes	No Data	No Data	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Mattila 2003 12578443	Yes	Potential for selection biases or not stated	Hospital controls	no adenoideotomy	Secure record	Yes*	unknown relative non-response rate	Not Applicable	Not Applicable	Yes	No	No Data	No	Yes	Not Applicable	Yes	Yes	No	Yes	No	Yes
KQ4																					
Becker 1987 3586818	Yes	Potential for selection biases or not stated	parental choice	NOTES[Parental choice]	Written self report or medical record only	Yes		unclear	No	No	No Data	NOTES [no analysis done.]	Not Applicable	No Data	Yes	Yes	Yes	Yes	No	No	
Cohen 1994 8289048	Yes	Potential for selection biases or not stated	same cohort of tubes	same cohort of tubes, but nonswimmers	Written self report or medical record only	Yes	Same rate for both groups*	Yes						No	Yes	Yes	No	Yes	No	Not Applicable	
el Silimy 1986 3780019	Yes	unclear	same surgical cohort	nonswimmers	Written self report or medical record	Yes	Same rate for both	Yes				Yes	Not Applicable	No Data	Yes	Not reported	No	Yes	Yes	Yes	

Study	Is the case definition adequate?	Representativeness of the cases	Selection of Controls	Definition of Controls	Ascertainment of Exposure	Same method of ascertainment for cases and controls	Non-Response rate	Allocation concealment	Dropout rate <20 percent	Blinded patient	Blinded outcome assessment	ITT	App. statistical analysis	If multicenter, was this accounted for in analysis?	Were potential confounders properly accounted for?	Clear reporting with no discrepancies	Were eligibility criteria clear?	Was selection bias likely?	Were interventions adequately described?	Were the outcomes fully defined?	Did the analyses account for compliance?
					only		group s*														
Kaufman n 1999 10546304	Yes	Consecutive or obviously representative series of cases*	same cohort	no water protection	Written self report or medical record only	Yes	Same rate for both group s*	Yes	No	No	Yes	Yes	Not Applicable	Yes	Yes	Yes	No	Yes	Yes	Not Applicable	
Salata 1996 8607955	Yes	Consecutive or obviously representative series of cases*	parent selection	received different prophylaxis	Written self report or medical record only	Yes	unclear	Yes	No	No	No	Yes	Not Applicable	Yes	Yes	Yes	unclear - high dropout	Yes	Yes	No	
Smelt 1984 6538215	Yes	unclear	same surgical cohort	nonswimmers	Written self report or medical record only	Yes	unclear	No	No	No	No	Yes	Not Applicable	No	Yes	No	No	No	No	No	
Wang 2009 19251534	Yes	Potential for selection biases or not stated	before/after	same patients	evaluator observation	Yes	Same rate for both group s*	Yes				Yes	Not Applicable	No Data	Yes	Yes	No	Yes	Yes	Not Applicable	
KQ5																					
Dohar 1999 10326811	Yes	Consecutive or obviously representative series of cases*	Hospital controls	historical and concurrent with the same dx	Secure record (eg surgical records)*	Yes	Same rate for both group s*	Not Applicable	Not Applicable	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

Appendix G. Patient-Centered and Quality of Life Outcomes

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
<i>Paradise, 2001, 2003, 2004, 2005, 2007</i>	11309632, 16093466, 12897272, 17229952, 15231974, 12690269	3 years	early treatment	206	cognitive	McCarthy General Cognitive index	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		3 years	early treatment	206	verbal	McCarthy Verbal Subscale	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		3 years	early treatment	206	cognitive	McCarthy Perceptual Performance Subscale	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		3 years	early treatment	206	cognitive	McCarthy Quantitative Subscale	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		3 years	early treatment	206	verbal	Peabody Picture Vocabulary Test-Revised	neither		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	verbal	Number of Different Words	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		6 years	early treatment	201			early		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	verbal	Mean Length of Utterance in Morphemes	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			neither		NS
			delayed treatment	193					
		6 years	early treatment	201			early		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	verbal	Percentage of Consonants Correct-Revised	delayed		NS
			delayed treatment	196					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		4 years	early treatment	202-204	verbal	Nonword repetition test	delayed	-3.4 (-6.2, -0.7)	<0.05
			delayed treatment	193					
		6 years	early treatment	201			delayed	-2 (-4.1, 0.1)	<0.05
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	QOL	Parenting Stress Index - parental distress subscale	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			delayed		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	QOL	Parenting Stress Index - parent-child dysfunction subscale	neither		NS
			delayed treatment	196					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	QOL	Parenting Stress Index - difficult child subscale	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			delayed		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	QOL	Parenting Stress Index - total stress	delayed		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		3 years	early treatment	206	Behavior	Child Behavior Checklist - anxious/depressed scale	neither		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	Behavior	Child Behavior Checklist - withdrawn scale	early		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			early		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	Behavior	Child Behavior Checklist - sleep problems scale	neither		NS
			delayed treatment	196					
		3 years	early treatment	206	Behavior	Child Behavior Checklist - somatic problems scale	early		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	Behavior	Child Behavior Checklist - aggression scale	early		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			early		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	Behavior	Child Behavior Checklist - delinquent/destructive scale	early		NS
			delayed treatment	196					
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		6 years	early treatment	201			early		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		3 years	early treatment	206	Behavior	Child Behavior Checklist - total problems	early		NS
			delayed treatment	196					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		4 years	early treatment	202-204			early		NS
			delayed treatment	193					
		9-11 years	early treatment	194			early	2 (0.1, 4.8)	<0.05
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		4 years	early treatment	202-204	Behavior	Child Behavior Checklist - social problems	early		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		4 years	early treatment	202-204	Behavior	Child Behavior Checklist - thought problems	early		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		4 years	early treatment	202-204	Behavior	Child Behavior Checklist - attention problems	early		NS
			delayed treatment	193					
		6 years	early treatment	201			neither		NS
			delayed	194					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			treatment						
			randomization consent withheld	101					
			not eligible for randomization	233					
		6 years	early treatment	201	verbal	Screening Test for Auditory Processing Disorders	delayed		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		6 years	early treatment	201	cognitive	Wechsler Intelligence Scale for Children - full scale IQ	neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		9-11 years	early treatment	195			not eligible		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		6 years	early treatment	201	cognitive	Wechsler Intelligence Scale for Children - Verbal IQ	neither		NS
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		6 years	early treatment	201	cognitive	Wechsler Intelligence Scale for Children - Performance IQ	delayed		NS

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			delayed treatment	194					
			randomization consent withheld	101					
			not eligible for randomization	233					
		9-11 years	early treatment	195	cognitive	Woodcock Reading Mastery Tests, revised, normative updated version - word identification subtest	delayed/not eligible		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	cognitive	Woodcock Reading Mastery Tests, revised, normative updated version - word attack subtest	delayed/not eligible		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	cognitive	Woodcock Reading Mastery Tests, revised, normative updated version - passage comprehension subtest	delayed/not eligible		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		grade 3 (9)	early treatment	37	verbal	Oral Reading Fluency Test	delayed		NS
			delayed treatment	37					
			randomization consent withheld	28					
			not eligible for	2					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			randomization						
		grade 4 (9-10)	early treatment	87	verbal	Oral Reading Fluency Test	not eligible	20 (compared to rct both arms the same); -17 (compared to randomization consent withheld)	<0.05
			delayed treatment	97					
			randomization consent withheld	63					
			not eligible for randomization	81					
		grade 5 (10-11)	early treatment	54	verbal	Oral Reading Fluency Test	delayed/not eligible		NS
			delayed treatment	51					
			randomization consent withheld	29					
			not eligible for randomization	115					
		grade 6 (11)	early treatment	12	verbal	Oral Reading Fluency Test	early/not eligible		NS
			delayed treatment	9					
			randomization consent withheld	5					
			not eligible for randomization	24					
		9-11 years	early treatment	194	cognitive	Woodcock-Johnson III Tests of Achievement, Standard Battery -- spelling subtest	not eligible	5 (compared to early/randomization withheld); -4 (compared to late)	<0.05
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for	223					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			randomization						
		9-11 years	early treatment	192	cognitive	Woodcock-Johnson III Tests of Achievement, Standard Battery -- writing samples subtest	delayed/not eligible		NS
			delayed treatment	195					
			randomization consent withheld	125					
			not eligible for randomization	223					
		9-11 years	early treatment	194	cognitive	Woodcock-Johnson III Tests of Achievement, Standard Battery -- calculation subtest	not eligible		NS
			delayed treatment	195					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	verbal	Comprehensive Test of Phonological Processing - Elision subtest	delayed/not eligible		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	verbal	Comprehensive Test of Phonological Processing - Rapid Letter Naming subtest	delayed/not eligible		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	verbal	Children's Version of the Hearing in Noise Test - competing noise from the front	early		NS

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	verbal	Children's Version of the Hearing in Noise Test - competing noise from the right	randomization consent withheld	1.4 (compared to not eligible)	<0.05
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	verbal	Children's Version of the Hearing in Noise Test - competing noise from the left	early	0.8 (compared to not eligible)	<0.05
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	194	Behavior	Disruptive Behavior Disorders Rating Scale - inattention factor	early		NS
			delayed treatment	196					
			randomization consent withheld	126					
			not eligible for randomization	223					
		9-11 years	early treatment	194	Behavior	Disruptive Behavior Disorders Rating Scale - impulsivity and overactivity factor	early	0.20 (compared to not eligible)	<0.05
			delayed treatment	196					
			randomization consent withheld	126					

study author, years	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			not eligible for randomization	223					
		9-11 years	early treatment	194	Behavior	Disruptive Behavior Disorders Rating Scale - oppositional defiant factor	early/randomization withheld		NS
			delayed treatment	196					
			randomization consent withheld	126					
			not eligible for randomization	223					
		9-11 years	early treatment	194	cognitive	Impairment Rating Scales - Overall functioning	early	0.18 (compared to not eligible)	<0.05
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	194	Behavior	Social Skills Rating System	delayed/not eligible		NS
			delayed treatment	194					
			randomization consent withheld	126					
			not eligible for randomization	223					
		9-11 years	early treatment	195	cognitive	Visual Continuous Performance Test - Inattention	early/randomization withheld		NS
			delayed treatment	196					
			randomization consent withheld	127					
			not eligible for randomization	223					
		9-11 years	early treatment	195	cognitive	Visual Continuous Performance Test - Impulsivity	early/randomization withheld		NS
			delayed treatment	196					
			randomization	127					

study author, years	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			consent withheld						
			not eligible for randomization	223					
		9-11 years	early treatment	155	verbal	Auditory Continuous Performance Test - Inattention	delayed/randomization withheld		NS
			delayed treatment	153					
			randomization consent withheld	100					
			not eligible for randomization	128					
		9-11 years	early treatment	155	verbal	Auditory Continuous Performance Test - Inattention	delayed		NS
			delayed treatment	153					
			randomization consent withheld	100					
			not eligible for randomization	128					
Rach 1991	2070526	ND	TT	22	verbal	verbal comprehension score	TT		NS
			control	21					
			TT	21	verbal	verbal expression score	TT		NS
			control	20					
Schilder 1997	9372253	2-4 years	TT	13	verbal	language measures: word forms production	TT	26.4 (SD 0.92)	P=0.03
			control	14					
		2-4 years	TT	13	verbal	language measures: concealed meaning	TT		NS
			control	14					
		2-4 years	TT	13	verbal	language measures: phonemic segmentation	TT		NS
			control	14					
		2-4 years	TT	13	verbal	language measures: sound blending	control		NS
			control	14					
		2-4	TT	13	verbal	language measures: auditory	TT	0.08 (SD 0.03)	P=0.03

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		years				discrimination			
			control	14					
<i>Rovers 2000</i>	10969126	0.5 years	TT	93	verbal	Reynell test (comprehensive language development)	watchful waiting		NS
			watchful waiting	94					
		1 year	TT	93	verbal	Reynell test (comprehensive language development)	TT		NS
			watchful waiting	94					
		0.5 years	TT	93	verbal	Schlichting test (expressive language development)	watchful waiting		NS
			watchful waiting	94					
		1 year	TT	93	verbal	Schlichting test (expressive language development)	watchful waiting		NS
			watchful waiting	94					
<i>Peters 1994</i>	8195687	93 months	TT	37	verbal	Grapheme (%)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Spelling: Words (%)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Spelling: Pseudowords (%)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	One-Minute (# correct)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Sentence Verification: Correct sentences (msec)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Sentence Verification: Incorrect sentences (msec)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Sentence Verification: Correct sentences (%)	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Sentence Verification: Incorrect sentences (%)	TT		NS

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Writing 1	TT		<0.001
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Writing 2	Control		NS
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Reading 3	TT		NS
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Reading 4	neither		NS
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Reading 5	Control		NS
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Arithmetic 6	Control		NS
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Arithmetic 7	Control		NS
			Control	151					
		93 months	TT	37	cognitive	Teachers' Ratings: Arithmetic 8	neither		NS
			Control	151					
		93 months	TT	37	verbal	Word Recognition: Words (msec)	TT		NS
			Control	151					
		93 months	TT	37	verbal	Word Recognition: Pseudowords (msec)	TT		NS
			Control	151					
		93 months	TT	37	verbal	Word Recognition: Words (%)	TT		NS
			Control	151					
		93 months	TT	37	verbal	Word Recognition: Pseudowords (%)	Control		NS
			Control	151					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
<i>Grievink 1993</i>	8246466	93 months	TT	132	verbal	Word Forms Production	neither		NS
			Control	51					
		93 months	TT	132	cognitive	Concealed Meaning	Control		NS
			Control	51					
		93 months	TT	132	verbal	Phonemic Segmentation: Words	Control		NS
			Control	51					
		93 months	TT	132	verbal	Phonemic Segmentation: Pseudo	Control		NS
			Control	51					
		93 months	TT	132	verbal	Sound Blending: Words	TT		NS
			Control	51					
		93 months	TT	132	verbal	Sound Blending: Pseudo	Control		NS
			Control	51					
		93 months	TT	132	verbal	Auditory Discrimination of Unequal Pairs: Words	Control		NS
			Control	51					
		93 months	TT	132	verbal	Auditory Discrimination of Unequal Pairs: Pseudo	Control		NS
			Control	51					
		93 months	TT	132	verbal	Auditory Discrimination of Equal Pairs: Words	TT		NS
			Control	51					
		93 months	TT	132	verbal	Auditory Discrimination of Equal Pairs: Pseudo	TT		NS
			Control	51					
<i>Hall 2009</i>	19260880	4.5 years	Early surgery	76	cognitive	School entry: Language	Early surgery	OR: 3.45 (1.42, 8.39)	0.006
			Watchful waiting	60					
		4.5 years	Early surgery	76	cognitive	School entry: Reading	Watchful waiting		NS (0.510)
			Watchful waiting	60					
		4.5 years	Early surgery	76	cognitive	School entry: Writing	Early surgery	OR: 3.74 (1.51, 9.27)	0.004

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			Watchful waiting	60					
		4.5 years	Early surgery	76	cognitive	School entry: Mathematics	Early surgery		NS (0.197)
			Watchful waiting	60					
		7-8 years	Early surgery	27	Behavior	Behaviour - teacher report: Prosocial	Early surgery		NS (0.877)
			Watchful waiting	24					
		7-8 years	Early surgery	27	Behavior	Behaviour - teacher report: Hyperactivity	Early surgery		NS (0.363)
			Watchful waiting	24					
		7-8 years	Early surgery	27	Behavior	Behaviour - teacher report: Emotional problems	Early surgery	OR: 4.11 (1.15, 14.64)	0.029
			Watchful waiting	24					
		7-8 years	Early surgery	27	Behavior	Behaviour - teacher report: Conduct problems	Watchful waiting		NS (0.803)
			Watchful waiting	24					
		7-8 years	Early surgery	27	Behavior	Behaviour - teacher report: Peer problems	Early surgery		NS (0.816)
			Watchful waiting	24					
		7-8 years	Early surgery	27	Behavior	Behaviour - teacher report: Total score	Early surgery		NS (0.237)
			Watchful waiting	24					
		7-8 years	Early surgery	35	verbal	Speech/language: Comprehension	Early surgery		NS (0.366)
			Watchful waiting	33					
		7-8 years	Early surgery	34	verbal	Speech/language: Oral expression	Early surgery		NS (0.143)
			Watchful waiting	32					
		7-8 years	Early surgery	35	verbal	Speech/language: Non-word: 3 syllable	Early surgery		NS (0.773)
			Watchful waiting	32					
		7-8 years	Early surgery	35	verbal	Speech/language: Non-word: 4 syllable	Early surgery		NS (0.656)
			Watchful waiting	32					
		7-8 years	Early surgery	35	verbal	Speech/language: Non-word: 5 syllable	Early surgery		NS (0.101)
			Watchful waiting	32					

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
		7-8 years	Early surgery	35	verbal	Speech/language: Non-word: total	Early surgery		NS (0.288)
			Watchful waiting	32					
		7-8 years	Early surgery	36	cognitive	IQ: Verbal IQ	Early surgery		NS (0.265)
			Watchful waiting	30					
		7-8 years	Early surgery	32	cognitive	IQ: Performance IQ	Early surgery		NS (0.145)
			Watchful waiting	30					
		7-8 years	Early surgery	29	cognitive	IQ: Total IQ	Early surgery		NS (0.100)
			Watchful waiting	29					
		7-8 years	Early surgery	81	cognitive	SATS KS1: Reading overall	Early surgery		NS (0.258)
			Watchful waiting	64					
		7-8 years	Early surgery	81	cognitive	SATS KS1: Writing	Early surgery		NS (0.192)
			Watchful waiting	64					
		7-8 years	Early surgery	81	cognitive	SATS KS1: Mathematics	Early surgery		NS (0.079)
			Watchful waiting	64					
<i>Maw 1999</i>	10459904	18 months	TT (Tympanostomy tubes within 6 weeks)	75	verbal	Verbal comprehension: standardized score	TT		NS (0.14)
			Watchful waiting (for 9 months then tubes if needed)	67					
		18 months	TT (Tympanostomy tubes within 6 weeks)	75	verbal	Expressive language: standardized score	TT		NS (0.059)
			Watchful waiting (for 9 months then tubes if needed)	67					
		18 months	TT (Tympanostomy	75	verbal	Verbal comprehension: chronological age/equivalent age	TT		NS (0.36)

<i>study author, years</i>	PMIDs	Age	Interventions	No. analyzed	Outcome type	Outcome	Favors	If significant, net difference or OR (95%CI)	P between groups NS = not significant at alpha = 0.05
			tubes within 6 weeks)						
			Watchful waiting (for 9 months then tubes if needed)	67					
		18 months	TT (Tympanostomy tubes within 6 weeks)	75	verbal	Expressive language: chronological age/equivalent age	TT		NS (0.36)
			Watchful waiting (for 9 months then tubes if needed)	67					
		18 months	TT (Tympanostomy tubes within 6 weeks)	75	Behavior	Richman score >= 10	TT		NS (0.66)
			Watchful waiting (for 9 months then tubes if needed)	67					
		18 months	TT (Tympanostomy tubes within 6 weeks)	75	Behavior	Richman score	TT		NS (0.13)
			Watchful waiting (for 9 months then tubes if needed)	67					
Vlastos 2011	21205368	1 year	TT AND adenoidectomy	22	QOL	OM-6	Myringotomy AND adenoidectomy		NS
			Myringotomy AND adenoidectomy	23					

Appendix H. Detailed Strength of Evidence Assessment

Key Question or Population	Outcome	Comparison	Risk of Bias for the evidence-base	Consistency	Precision	Directness	Overall Rating	Key Findings and Comments
<i>Key question 1</i>								
Effectiveness of TT in children with chronic MEE	Improvement (decrease) in mean hearing level 1-3 months	TT vs. Watchful waiting	Moderate to high	Consistent	Somewhat imprecise	Mix of direct and indirect from network MA	Moderate	6 RCT Effective: - 9.1 dB (CrI: -14.0, -3.4)
		TT & Adenoidectomy vs. Watchful waiting	Moderate to high	Consistent	Somewhat imprecise	Mix of direct and indirect from network MA	Moderate	6 RCT Effective: -10 dB (CrI: -19.0, -1.9)
	Improvement (decrease) in mean hearing level (12-24 months)	TT vs. Watchful waiting	Moderate to high	Consistent	Mostly precise	Mix of direct and indirect from network MA	Moderate	5 RCT Not effective: 0.03 dB (CrI: -4.0, 3.4)
		TT & Adenoidectomy vs. Watchful waiting	Moderate to high	Consistent	Imprecise	Mix of direct and indirect from network MA	Insufficient	5 RCT Possibly effective: -3.8 dB (CrI: -8.6, 0.62)
	Decrease in mean duration of time with middle ear effusion	TT vs. Watchful waiting	Moderate to high	Consistent	Imprecise	Mix of direct and indirect from network MA	Insufficient	6 RCT Possibly effective: -17 weeks (CrI: -40.0, 4.9)
		TT & Adenoidectomy vs. Watchful waiting	Moderate to high	Consistent	Imprecise	Mix of direct and indirect from network MA	Insufficient	6 RCT Possibly effective: -23 weeks (CrI: -56.0, 9.9)
	Quality of life and patient – centered outcomes	TT vs Watchful waiting	Low to moderate	Consistent	Imprecise	Direct	Low	5 RCTs, 3 NRCS Not effective Multiple outcomes No quantitative synthesis done
	Hearing test as a modifier of		Moderate to high	Unknown	Imprecise	Direct	Insufficient	No quantitative synthesis done

Key Question or Population	Outcome	Comparison	Risk of Bias for the evidence-base	Consistency	Precision	Directness	Overall Rating	Key Findings and Comments
	effectiveness							
	Other patient factors which modify effectiveness of TT		Moderate to high	Unknown	Imprecise	Direct	Insufficient	No quantitative synthesis Sparse reporting of potential predictors
Separately for populations at high risk (e.g. cleft palate, Down syndrome)	various		High	Inconsistent	Imprecise	Direct	Insufficient	No RCTs 6 NRCSs
<i>Key question 2</i>								
Tympanostomy tubes in children with recurrent AOM		TT vs. Watchful waiting	High	Consistent	Imprecise	Direct	Low	6 RCTs (1049 patients) No quantitative synthesis Magnitude of clinically important effects unclear
		TT vs. TT & Adenoidectomy	Moderate to high	Consistent	Imprecise	Direct	Low	3 RCTs No quantitative synthesis
	Quality of Life	TT vs. Watchful waiting	Moderate	NA	Imprecise	Direct	Low	1 RCT
	Factors which identify children most likely to benefit	TT vs. Watchful waiting	High	Unknown	Imprecise	Indirect	Insufficient	
<i>Key question 4</i>								
Ear plugs or water restrictions in children with TT	Average rate of otorrhea	Ear plugs vs. no precautions	Moderate	NA	Imprecise	Direct	Low	Possibly effective Single RCT Magnitude of clinically important effects unclear
		Nonswimming vs. no precautions	High	NA	Imprecise	Direct	Low	No effect Single RCT
	Risk of one or more episodes of	Ear plugs vs. no precautions	High	Consistent	Imprecise	Direct	Low	Not effective 4 NRCSs OR 1.7 (CrI: 0.9, 3.1)

Key Question or Population	Outcome	Comparison	Risk of Bias for the evidence-base	Consistency	Precision	Directness	Overall Rating	Key Findings and Comments
	otorrhea	Nonswimming vs. no precautions	High	Mostly consistent	Imprecise	Direct	Low	Not effective 6 NRCSs OR 1.52 (CrI: 0.7, 3.2)
<i>Key question 5</i>								
Treatment of TT otorrhea		Topical antibiotic-glucocorticoid drops vs. watchful waiting	Moderate	Consistent	Somewhat imprecise	Mix of direct and indirect from network MA	Moderate	Network MA of 10 studies Effective: OR 12.0 (CrI: 1.9, 83.0)
		Topical antibiotic drops vs watchful waiting	Moderate	Consistent	Somewhat imprecise	Mix of direct and indirect from network MA	Moderate	Network MA of 10 studies Effective: OR 7.2 (CrI: 1.2, 50.0)
		Topical antibiotic-glucocorticoid drops vs. oral antibiotics	Moderate	Consistent	Somewhat imprecise	Mix of direct and indirect from network MA	Moderate	Network MA of 10 studies Effective: OR 5.3 (CrI: 1.2, 28.0)
		Topical antibiotic vs. oral antibiotics	Moderate	Consistent	Imprecise	Mix of direct and indirect from network MA	Insufficient	Network MA of 10 studies OR 3.3 (CrI: 0.74, 17.0)
	Quality of Life		Moderate	NA	Imprecise	Direct	Insufficient	Single RCT

MA: metaanalysis; CrI: Credible Interval;

Criteria for scoring: Consistency scored as ‘NA’ if based on a single study, ‘Mostly consistent’ a minority of studies had opposite effect, ‘Unknown’ if review found minimal evidence in either direction; Precision scored as ‘Somewhat imprecise’ if credible interval excluded the null effect, but includes effects which might not be considered clinically significant.

Appendix I. Adverse Events

Author PMID Country	Design (recruitment period)	Perioperative Complications	Otorrhea	Tube Blockage	Granulation Tissue	Premature Extrusion	TT Displacement	Persistent Perforation	Myringosclerosis	Atrophy/Atelectasis/Retraction	Cholesteatoma	Hearing Loss
Hoffman 12220208 US	prosp/retro cohort	X										
Djurhuus 25724629 Denmark	retro cohort (1997-2011)										X	
Golz 10187945 US, Israel	retro cohort (1980-1994)		X					X				
Golz 10406312 Israel	retro cohort (1978-1997)										X	
Spilsbury 23737350 Australia	retro cohort (1980-2009)										X	
van Dongen 23874870 Netherlands	retro cohort (2009-2011)		X									
Bonding 4215997 US	cohort (1967-1969)									X	X	
Bonding 4702615 Denmark	cohort									X		
Brown 8231117 US	cohort		X			X		X				X
Debruyne 3799183 Belgium	cohort		X					X				
Jung 19715725 Korea	cohort (2004-2008)		X									
Kokko 1267359 Finland	cohort (1965-1971)					X	X	X			X	
Tos 7192477 Denmark	cohort										X	
Tuli 23119801 India	cohort		X			X		X				X
Ah-Tye 11389239 US	prosp cohort (1992-1996)		X									
Ahmet 11271428 Turkey	prosp cohort (1988-1997)								X			
Allen 16156910 US	prosp cohort (9/2001-11/2001)		X	X								
Baarle 1169745 Netherlands	prosp cohort					X		X				
Birck 1267356 US	prosp cohort (1972-1974)			X	X		X	X	X		X	
Brodsky 10591365 US	prosp cohort (1998-1999)	X	X	X								
Carignan 17049144 Canada	prosp cohort (2003-2004)							X				
Chevretton 3427802 UK	prosp cohort							X	X			
Costa 3472336 Brazil	prosp cohort							X				X
Daly 12759263 US	prosp cohort (1987-1990)					X		X	X	X		X
De Beer 15224825 Netherlands	prosp cohort (1982-1983)							X	X			
Debruyne 3177616 Belgium	prosp cohort		X					X				
Eliachar 6613541 Israel	prosp cohort (1975-1981)			X	X	X		X		X	X	
Fiebach 3570884 Germany	prosp cohort (1979-1984)						X	X	X			

Author PMID Country	Design (recruitment period)	Perioperative Complications	Otorrhea	Tube Blockage	Granulation Tissue	Premature Extrusion	TT Displacement	Persistent Perforation	Myringosclerosis	Atrophy/Atelectasis/Retraction	Cholesteotoma	Hearing Loss
Fior 6526581 Italy	prosp cohort (1968-1978)						X	X		X		
Florentzson 22648089 Sweden	prosp cohort (1/1996-12/1996)							X				
Friedman 11551611 US	prosp cohort								X			
Gates 3128752 US	prosp cohort (1980-1986)		X									
Gourin 10208683 US	prosp cohort (1995-1997)		X									
Gundersen 1267702 Norway	prosp cohort								X		X	X
Hammarén-Malmi 17582514 Finland	prosp cohort (2001-2002)					X						
Hampton 9118580 Ireland	prosp cohort							X				
Heaton 8877228 UK	prosp cohort (1986-1988)		X			X					X	
Ida 19324425 US	prosp cohort		X			X						
Isaacson 18722211 US	prosp cohort (1997-2007)	X		X								X
Khan 16773972 Pakistan	prosp cohort (2001-2003)					X		X	X			
Levine 8179266 US	prosp cohort							X				
Levinson 6819525 US	prosp cohort		X		X							
Li 10547462 US	prosp cohort (1987-1991)									X		
MacKinnon 4105168 UK	prosp cohort (1965-1971)					X		X			X	
Mackenzie 6541254 UK	prosp cohort (1978-1980)			X			X	X	X			X
Mandel 8085732 US	prosp cohort (1979-1990)		X									
Marzouk 22183900 US	prosp cohort (2009-2010)		X									
Muenker 6778334 Germany	prosp cohort (1966-1978)				X		X	X			X	
Owen 8436453 US	prosp cohort		X									X
O'Reilly 18594333 US	prosp cohort		X									
Pereira 16446953 Brazil	prosp cohort (2001-2002)		X					X	X	X	X	
Plotkin 7195446 US	prosp cohort (1977-1979)		X		X			X				
Postma 9350484 US	prosp cohort (1988-1991)							X				
Powell 25598389 UK	prosp cohort (2004-2005)		X	X				X		X	X	
Praveen 15992470 UK	prosp cohort (1998-2003)					X				X		
Roos 2128487 Sweden	prosp cohort		X									
Rosenfeld 10807325 US	prosp cohort (1997-1998)		X									
Rothera 4040147 UK	prosp cohort (1980-1982)		X					X			X	
Saki 24303379 Iran	prosp cohort (2009-2011)		X	X	X	X	X	X	X	X		
Siddiqui 9225174 UK	prosp cohort (1987-1992)		X					X				

Author PMID Country	Design (recruitment period)	Perioperative Complications	Otorrhea	Tube Blockage	Granulation Tissue	Premature Extrusion	TT Displacement	Persistent Perforation	Myringosclerosis	Atrophy/Atelectasis/Retraction	Cholesteatoma	Hearing Loss
Slack 6470572 UK	prosp cohort								X			
Spielmann 18047760 UK	prosp cohort (2003-2004)		X	X		X						X
Stenstrom 16330739 Canada	prosp cohort (1985-1989)								X			X
Suetake 2239252 Japan	prosp cohort (1986-1987)		X					X				
Tavin 3372141 US	prosp cohort (1982-1985)		X		X							
Tos 3814387 Denmark	prosp cohort (1970-1975)								X	X	X	
Tos 985199 Denmark	prosp cohort							X	X	X	X	
Valtonen 10435125 Finland	prosp cohort (1983-1984)		X		X	X		X				
Valtonen 12150521 Finland	prosp cohort (1983-1984)							X		X		
Valtonen 15837895 Finland	prosp cohort (1983-1984)							X		X	X	
Valtonen 15837896 Finland	prosp cohort (1983-1984)							X	X	X		X
Valtonen 16094135 Finland	prosp cohort (1983-1993)		X					X		X		
Van Cauwenberge 576016 Belgium	prosp cohort							X				
Walker 9287928 Australia	prosp cohort		X	X				X				
Weigel 2645490 US	prosp cohort (1983-1984)		X	X				X				
Daly 9738746 US	cross-sectional (1979-1990)								X	X		X
De Beer 16151352 Netherlands	prosp nrcs							X	X	X		
Jamal 7543180 Saudi Arabia	prosp nrcs			X								
Cannon 11797262 US	nrcs		X									
Rakover 9176804 Israel	nrcs											X
Smillie 25171763 Scotland	nrcs (2002-2012)		X	X	X			X	X	X	X	
Hormann -Iowa-Kollektiv 1816937 Germany	prosp nrcs		X					X		X	X	
Luo 25465449 China	prosp nrcs (2011-2012)		X	X	X				X		X	
Siegel 12161732 US	prosp nrcs (1998-2000)		X									
Velepici 21397957 Croatia	prosp nrcs (2004-2009)							X	X	X		
Klockars 22796197 Finland	rct			X	X	X		X				
Daly 8745020 US	prosp rct (1987-1990)		X									
Dawes 1742892 UK	prosp rct		X	X		X			X			
De Eredità 16406076 Italy	prosp rct (2001-2003)		X					X				
Dohar 16880248 US	prosp rct (2003-2004)			X								
El-Sayed RN16339 Saudi Arabia	prosp rct					X						
Gates 2492178 US	prosp rct		X									

Author PMID Country	Design (recruitment period)	PerioperativeComplications	Otorrhea	TubeBlockage	GranulationTissue	PrematureExtrusion	TTDisplacement	PersistentPerforation	Myringosclerosis	AtrophyAtelectasisRetraction	Cholesteotoma	HearingLoss
Gates 3683478 US	prosp rct (1980-1984)		X				X	X			X	
Ingels 16429748 Netherlands	prosp rct (1996-1997)		X									
Paradise 11309632 US	prosp rct (1991-1995)				X			X	X	X		
Poetker 17178938 US	prosp rct (2002-2003)		X	X								
Roland 14702493 US, Canada	prosp rct			X								
Wallace 15533143 UK	prosp rct (2001-2002)		X	X		X						
Paradise 2181158 US	prosp rct/nrcs (1971-1985)					X					X	

Perioperative complications associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	% male	%rAOM [%COME]	Followup	N [ears]	% Perioperative Complications	Definition
Hoffman 12220208 US	prosp/retro cohort	nr	nr	nr	nr	nr	3198	0.81	intraoperative, including upper airway obstruction, agitation, prolonged recovery, emesis, laryngospasm, desaturation, bradycardia, dysrhythmia, stridor
Brodsky 10591365 US	prosp cohort (1998-1999)	nr	3.95 (5.09) [0.50, 23.67]	56.6	[75.8]	1 to 3 months	54 [96]	[1.04]	ear canal abrasion
Isaacson 18722211 US	prosp cohort (1997-2007)	Armstrong beveled grommet tube	[0.11, 21.00]	nr	nr	nr	[10000]	[0.01]	tympanic membrane tear

Three studies¹⁻³ report on perioperative complications associated with placement of tympanostomy tubes (TT). Two studies were prospective cohorts^{1,2} and one study employed a prospective and retrospective cohort design³. Years of recruitment range from 1998 to 2007. Patient age ranged from 0.5 to 23.7 years, as reported by two studies^{1,3}. One study reported 56.6 percent of included patients were male¹. One study reported 75.8 percent of patients had chronic otitis media with effusion (OME)¹. Follow up times ranged from one to three months. Study sample size ranged from 54 to 3,198 patients (studies that reported sample size in terms of ears enrolled from 96 to 10,000 ears). One study reported 0.8 percent of patients experienced perioperative complications²; two studies reported 0.01 to 1.04 percent of ears experienced perioperative complications^{1,3}.

Tube blockage associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Tube Blockage	Definition
Allen 16156910 US	prosp cohort (9/2001-11/2001)	Sheehy (0.12 cm diameter) tube	4 [0.75, 11.83]	68.1	74 [19.5]	2 weeks	112	10.71	nr
Birck 1267356 US	prosp cohort (1972- 1974)	nr	nr	59.2	nr	6+ months	736 [2327]	[2.49]	tubes occluded
Brodsky 10591365 US	prosp cohort (1998- 1999)	nr	3.95 (5.09) [0.50, 23.67]	56.6	[75.8]	1 to 3 months	54 [96]	[4.05]	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Tube Blockage	Definition
Eliachar 6613541 Israel	prosp cohort (1975- 1981)	Goode long- term T-shaped silicone design tubes	8.33 [4.50, 16.00]	nr	nr	8 to 72 months	122 [203]	[2.96]	blockage
Isaacson 18722211 US	prosp cohort (1997- 2007)	Armstrong beveled grommet tube	[0.11, 21.00]	nr	nr	nr	[10000]	[0.03]	permanent
Mackenzie 6541254 UK	prosp cohort (1978- 1980)	Pappas 1974, Shah 1971 (Exmoor 142, Shepard 137, Bobbin 132, Arrow 58, Shah 131, Armstrong 138, Colar Button 141, Paparella 60)	10.80 [0.75, 77.00]	58.3	0 [100]	2.25 years	588 [939]	[17.15]	not patent at 3 month f/u
Powell 25598389 UK	prosp cohort (2004- 2005)	nr	4.60	nr	nr	9 weeks to 10 years	89	8.99	blocked tube at 9 weeks
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	3.85	obstruction of the VT on the tympanic membrane
Spielmann 18047760 UK	prosp cohort (2003- 2004)	nr	5.30 [0.83, 9.00]	61.4	18.8 [81.2]	3 months	84 (calculated) [195]	10.71	nr
Walker 9287928 Australia	prosp cohort	Shepard grommet, Shah vent tube, Sheehy collar button vent tube	3.80	nr	12 [85]	until extrusion	106	[2.83]	luminal obstruction
Weigel 2645490 US	prosp cohort (1983- 1984)	Goode T-tubes, Armstrong Teflon, Reuter- Bobbin Stainless Steel, Shepard Teflon	3.80 [0.60, 13.00]	59	45 [41]	21 months	75 [150]	[37.33]	temporary or permanent
Jamal 7543180 Saudi Arabia	prosp ncrs	[myringotomy + ventilation tube insertion]	nr	54.2	0 [100]	3 months	40 [76]	17.50	nr
Jamal 7543180 Saudi Arabia	prosp ncrs	[myringotomy + ventilation tube	nr	54.2	0 [100]	3 months	32 [60]	0	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Tube Blockage	Definition
		insertion + xylometazoline hydrochloride]							
Smillie 25171763 Scotland	nrcs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	6.67	grommet occlusion-wax
Smillie 25171763 Scotland	nrcs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	1.67	grommet occlusion-wax
Luo 25465449 China	prosp nrcs (2011- 2012)	[tympanostomy tube insertion]	4.80 (1.00) [2.00, 8.00]	50.9	nr	2 years	55	9.09	tube blockage
Klockars 22796197 Finland	rct	[closure of the lip at the age of 3-4 months and closure of the hard and soft palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	44	[41.89]	extruded or occluded
Klockars 22796197 Finland	rct	[closure of the lip and soft palate at the age of 3-4 months and closure of the hard palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	49	[39.29]	extruded or occluded
Dawes 1742892 UK	prosp rct	Shah pattern tube [only sufficient effusion was aspirated to provide clearly vie of the myringotomy]	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	2.22	nr
Dawes 1742892 UK	prosp rct	Shah pattern tube [effort was made to aspirate all of	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	2.22	

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Tube Blockage	Definition
		the effusion using the fine end (20 gauge) of a Zoellner sucker which was inserted through the incision]							
Dohar 16880248 US	prosp rct (2003-2004)	[underwent tympanostomy]	[0.50, 11.00]	52.5	nr	3 weeks	39	2.56	device blockage
Poetker 17178938 US	prosp rct (2002-2003)	Teflon-coated, fluoroplastic Armstrong beveled TT [receiving ofloxacin otic drops]	1.88 [0.50, 6.67]	55	nr	2 weeks	99 [198]	24.24	tube failure: tube plugging + otorrhea
Poetker 17178938 US	prosp rct (2002-2003)	Teflon-coated, fluoroplastic Armstrong beveled TT [no postoperative otic drop prophylaxis]	1.88 [0.67, 12.00]	55	nr	2 weeks	87 [174]	59.77	tube failure: tube plugging + otorrhea
Poetker 17178938 US	prosp rct (2002-2003)	Teflon-coated, fluoroplastic Armstrong beveled TT [receiving neomycin sulfate-polymyxin B sulfate-hydrocortisone otic drops]	2.17 [0.42, 12.17]	54	nr	2 weeks	91 [182]	15.38	tube failure: tube plugging + otorrhea
Roland 14702493 US, Canada	prosp rct	nr	2.45 [0.50, 12.00]	62.3	nr	18 days	599	0.17	tube blockage
Wallace 15533143 UK	prosp rct (2001-2002)	Shepard or T tube [reviewed at 1 month	7.00 [2.00, 15.00]	69.7	87.9	1 month	29	[9.43]	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Tube Blockage	Definition
		only]							
Wallace 15533143 UK	prosp rct (2001- 2002)	Shepard or T tube [reviewed at 1 week and at 1 month]	6.00 [1.00, 13.00]	63.6	75.8	1 month	26	[6.52]	1 month follow up

Twenty studies^{1, 3-21} (representing 27 cohorts) report on tube blockages associated with placement of tympanostomy tubes (TT). Eleven studies were prospective cohorts^{1, 3-5, 8, 12, 14, 16, 18, 19, 21}, three studies employed a non-randomized comparative study design^{9, 11, 17} (two were prospective^{9, 11}), and six studies employed a randomized control trial design^{6, 7, 10, 13, 15, 20}. Years of recruitment range from 1972 to 2012. Patient age ranged from 0.25 to 23.7 years, as reported by twenty studies^{1, 3-21}. Sixteen studies^{1, 4-7, 9-13, 15-18, 20, 21} report information on the percentage of males in the study. These percentages range from 50 to 69.7 percent with a mean of 57.56 percent. Nine studies reported zero to 87.9 percent of patients had recurrent acute otitis media (rAOM) and 19.5 to 100 percent of patients had chronic otitis media with effusion (OME)^{1, 4, 9, 12, 16, 18-21}. Follow up times ranged from two weeks to ten years or until tube extrusion. Study sample size ranged from 25 to 736 patients with a mean of 136 patients. Studies that reported sample size in terms of ears enrolled from 50 to 10,000 ears with a mean of 1,050 ears. A median of 7.8 percent of patients (25th percentile: 0%, 75th percentile: 13%) experienced tube blockage. A median of 6.5 percent of ears (25th percentile: 2.8%, 75th percentile: 37.3%) experienced tube blockage.

Granulation tissue associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Granulation Tissue	Definition
Birck 1267356 US	prosp cohort (1972- 1974)	nr	nr	59.2	nr	6+ months	736 [2327]	[0.17]	nr
Eliachar 6613541 Israel	prosp cohort (1975- 1981)	Goode long- term T-shaped silicone design tubes	8.33 [4.50, 16.00]	nr	nr	8 to 72 months	122 [203]	[5.91]	local granuloma
Levinson 6819525 US	prosp cohort		[1.00, 11.00+]	nr	nr	5 months	64 [124]	[5.65]	granulations and discharge
Muenker 6778334 Germany	prosp cohort (1966- 1978)	nr	nr	nr	nr	nr	631 [1060]	[1.79]	nr
Plotkin 7195446 US	prosp cohort (1977- 1979)	Castelli membrane,	5.20 [2.50, 11.00]	60.7	0 [100]	nr	89 [162]	[1.85]	polypoid granulations fromed around the tube

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Granulation Tissue	Definition
		Donaldson design, silicone tube (Xomed XO-1201)							
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	3.37	nr
Tavin 3372141 US	prosp cohort (1982- 1985)	multiple TT types	4.80 (1.50) [0.33, 16.00]	63.2	nr	365 to 728 days	95 [187]	[2.14]	resulted in granuloma formation between 90 and 183 days
Valtonen 10435125 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	281 [281]	[5.69]	nr
Smillie 25171763 Scotland	nracs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	0	nr
Smillie 25171763 Scotland	nracs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	1.67	nr
Luo 25465449 China	prosp nracs (2011- 2012)	[tympanostomy tube insertion]	4.80 (1.00) [2.00, 8.00]	50.9	nr	2 years	55	12.73	granulation formation
Klockars 22796197 Finland	rct	[closure of the lip at the age of 3-4 months and closure of the hard and soft palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	44	[2.70]	tympanic membrane granulation tissue
Klockars 22796197 Finland	rct	[closure of the lip and soft palate at the age of 3-4 months and closure of the hard palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	49	[2.38]	tympanic membrane granulation tissue
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT nontrial;	5.00	52.6	0 [100]	~2 years	6 [12]	0 [0]	fibrosis

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Granulation Tissue	Definition
		underwent TT insertion at parents' discretion]							
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT late treatment; underwent TT insertion 6-9 months after initiation of symptoms]	5.00	52.6	0 [100]	~2 years	51 [102]	1.96 [2.00]	fibrosis
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT early treatment; underwent TT insertion at initiation of symptoms]	5.00	52.6	0 [100]	~2 years	121 [242]	0 [1.24]	fibrosis

Twelve studies^{5, 8, 10, 11, 16, 17, 22-27} (representing 16 cohorts of patients) report on granulation tissue associated with placement of tympanostomy tubes (TT). Eight studies report prospective cohorts^{5, 8, 16, 22, 23, 25-27}, two are nonrandomized comparative studies (three cohorts of patients)^{11, 17}, and two are randomized controlled trials (5 cohorts of patients)^{10, 24}. Years of recruitment range from 1966 to 2012. Patient age ranged from 0.25 to 16 years, as reported by ten studies^{8, 10, 11, 16, 17, 22, 24-27}. Nine studies reported the percentage of males in each study, which ranged from 50.9 to 63.2 percent with a mean of 57.5 percent^{5, 10, 11, 16, 17, 24-27}. Four studies reported data on the proportions of patients with recurrent acute otitis media (rAOM) and chronic otitis media with effusion (OME)^{16, 24, 25, 27}. Three studies reported zero patients with rAOM and 100 percent of patients with chronic OME^{16, 24, 25}. One study reported 34.2 percent of patients with rAOM and 65.8 percent of patients with chronic OME²⁷. Follow up times ranged from five months to five years. Study sample size ranged from six patients to 736 with a mean of 162 patients. Studies that reported sample size in terms of ears enrolled 12 to 2,327 ears with a mean of 470 ears. A median of 1.7% of patients (25th percentile: 0%, 75th percentile: 3.4%) experienced granulation tissue. A median of 2.1 percent of ears (25th percentile: 1.5%, 75th percentile: 4.2%) experienced granulation tissue. The definitions used for granulation tissue ranged from fibrosis, granulation formation, tympanic membrane granulation tissue, granulations and discharge, local granuloma, and polypoid granulation formed around the tympanostomy tube.

Premature extrusions associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Premature Extrusion	Definition
Brown 8231117 US	cohort	Goode T-tubes	nr	nr	nr	6 months	168 [328]	0	premature extrusion
Kokko 1267359 Finland	cohort (1965-1971)	nr	nr	nr	nr	3.167 years (average)	[290]	[0.24]	in the case with the shortest duration, tube extruded after two days as a result of purulent discharge
Tuli 23119801 India	cohort	nr	nr	66.7	0 [100]	nr	100	4.00	early dislocation of grommet (but 100 had extrusion between 0-189 days)
Baarle 1169745 Netherlands	prosp cohort	Double-flanged, Silastic tubes (Richards)	nr	nr	nr	12+ weeks	60	13.33	one tube found to be extruded after first visit in 5, while one of the tubes had to be removed in the 3 others
Daly 12759263 US	prosp cohort (1987- 1990)	nr	[0.50, 8.00]	61	nr	3 to 8 years	138 [275]	[56.00]	2 or more surgical procedures
Eliachar 6613541 Israel	prosp cohort (1975- 1981)	Goode long- term T-shaped silicone design tubes	8.33 [4.50, 16.00]	nr	nr	8 to 72 months	122 [203]	81.82	extruded spontaneously in the course of middle ear infections that occurred in the follow-up period
Hammarén- Malmi 17582514 Finland	prosp cohort (2001- 2002)	nr	1.90 [1.00, 4.00]	54	nr	12 months	217	73.74	tympanostomy tube lost or non-patent during follow-up (12 months)
Heaton 8877228 UK	prosp cohort (1986- 1988)	nr	5.00 [1.00, 12.00]	60.6	0 [100]	nr	127	34.65	undergone insertion of a subsequent tube or tubes
Ida 19324425 US	prosp cohort	pressure equalization tube	[0.67, 4.00]	nr	0 [100]	16 months	50	58.00	extrusions (not otherwise defined)
Khan 16773972 Pakistan	prosp cohort (2001- 2003)	nr	[2.00, 40.00]	66.6	0 [100]	18 to 24 months	57 [114]	[0.88]	nr
MacKinnon 4105168 UK	prosp cohort (1965- 1971)	nr	=<16.00	nr	nr	nr	95 [165]	37.89 [39.39]	requiring grommets on more than one occasion

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Premature Extrusion	Definition
Praveen 15992470 UK	prosp cohort (1998- 2003)	Shah ventilation tubes	5.00 [1.60, 14.50]	64	nr	nr	606 [1174]	8.42	early extrusions
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	5.77	early extrusion from the membrane
Spielmann 18047760 UK	prosp cohort (2003- 2004)	nr	5.30 [0.83, 9.00]	61.4	18.8 [81.2]	3 months	84 (calculated) [195]	10.71	nr
Valtonen 10435125 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	281 [281]	[1.78]	ventilation tube extruded early, within two weeks post-operatively
Klockars 22796197 Finland	rct	[closure of the lip at the age of 3-4 months and closure of the hard and soft palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	44	[41.89]	extruded or occluded
Klockars 22796197 Finland	rct	[closure of the lip and soft palate at the age of 3-4 months and closure of the hard palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	49	[39.29]	extruded or occluded
Dawes 1742892 UK	prosp rct	Shah pattern tube [only sufficient effusion was aspirated to provide clearly vie of the myringotomy]	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	0	nr
Dawes 1742892 UK	prosp rct	Shah pattern tube [effort was made to aspirate all of	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	2.22	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Premature Extrusion	Definition
		the effusion using the fine end (20 gauge) of a Zoellner sucker which was inserted through the incision]							
El-Sayed RN16339 Saudi Arabia	prosp rct	nr	0.14	54.8	nr	6 months	31	6.45	nr
Wallace 15533143 UK	prosp rct (2001- 2002)	Shepard or T tube [reviewed at 1 month only]	7.00 [2.00, 15.00]	69.7	87.9	1 month	29	[3.77]	nr
Wallace 15533143 UK	prosp rct (2001- 2002)	Shepard or T tube [reviewed at 1 week and at 1 month]	6.00 [1.00, 13.00]	63.6	75.8	1 month	26	[4.35]	1 month
Paradise 2181158 US	prosp rct/nrcs (1971-1985)	[underwent adenoidectomy (some control subjects received adenoidectomy but not included in N_patients)]	nr	67	nr	nr	97	[5.60]	perforations remaining unhealed for periods of 10 months to 4.5 years

Twenty studies^{6, 8, 10, 16, 18, 20, 27-40} (representing 23 cohorts) report on premature extrusion associated with placement of tympanostomy tubes (TT). Fifteen studies were cohorts^{8, 16, 18, 27-29, 31-36, 38-40} (12 prospective^{8, 16, 18, 27, 29, 31-34, 36, 38, 40}), four studies employed a randomized control trial design^{6, 10, 20, 30}, and one study employed a combined RCT/NRCS design³⁷. Years of recruitment range from 1972 to 2012. Patient age ranged from 0.14 to 16 years, as reported by 15 studies^{6, 8, 10, 16, 18, 20, 27, 29-34, 36, 38}. Percentages of males enrolled in fourteen studies ranged from 50 to 69.7 percent with a mean of 60.45 percent^{6, 10, 16, 18, 20, 27, 29-32, 34, 37-39}. Eight studies reported zero to 87.9 percent of patients had recurrent acute otitis media (rAOM) and 65.8 to 100 percent of patients had chronic otitis media with effusion (OME)^{16, 18, 20, 27, 32-34, 39}. Follow up times ranged from three weeks to five years. Study sample size ranged from 25 to 606 patients with a mean of 120 patients. Studies that report sample size in terms of ears enrolled 50 to 1,174 ears with a mean

of 285 ears. A median of 9.6 percent of patients (25th percentile: 4%, 75th percentile: 37.9%) experienced premature extrusions. A median of 5.0 percent of ears (25th percentile: 1.8%, 75th percentile: 39.4%) experienced premature extrusions.

TT displacement associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	TT Displacement	Definition
Kokko 1267359 Finland	cohort (1965-1971)	nr	nr	nr	nr	3.167 years (average)	[290]	[0.69]	slippage of TT into tympanum
Birck 1267356 US	prosp cohort (1972- 1974)	nr	nr	59.2	nr	6+ months	736 [2327]	[0.60]	tubes in tympanum
Fiebach 3570884 Germany	prosp cohort (1979- 1984)	nr	[1.00, 6.00]	60.5	nr	nr	534 [1000]	0.37	nr
Fior 6526581 Italy	prosp cohort (1968- 1978)	Shepard type	3.00 [0.33, 6.00]	60.6	100 [0]	5 to 15 years	61 [108]	[0.93]	Migration of the tube into the tympanic cavity
Mackenzie 6541254 UK	prosp cohort (1978- 1980)	Pappas 1974, Shah 1971 (Exmoor 142, Shepard 137, Bobbin 132, Arrow 58, Shah 131, Armstrong 138, Colar Button 141, Paparella 60)	10.80 [0.75, 77.00]	58.3	0 [100]	2.25 years	588 [939]	[2.34]	nr
Muenker 6778334 Germany	prosp cohort (1966- 1978)	nr	nr	nr	nr	nr	631 [1060]	[0.75]	extrusion into the tympanic cavity
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	0.48	displacement into the middle ear
Gates 3683478 US	prosp rct (1980- 1984)	Shepherd tubes [TT and TT+ adenoidectomy arms]	[4.00, 8.00]	59	0 [100]	2 years	253	1.19	tube extruded into the middle ear

Eight studies report on tympanostomy tube displacement associated with placement of tympanostomy tubes (TT)^{5, 12, 16, 23, 35, 41-43}. Seven studies^{5, 12, 16, 23, 35, 41, 42} were cohorts (6 prospective^{5, 12, 16, 23, 41, 42}), and one study employed a randomized control trial design⁴³. Years of recruitment range from 1965 to 2011. Patient age ranged from 0.33 to 77 years, as reported by five studies^{12, 16, 41-43} (4 of the 5 studies reported a maximum age ≤ 8 years^{16, 41-43}). Percentages of males enrolled in these studies ranged from 55.8 to 60.6 percent

with a mean of 58.9 percent^{5, 12, 16, 41-43}. Three studies reported zero percent of patients had recurrent acute otitis media (rAOM) and 100 percent of patients had chronic otitis media with effusion (OME)^{12, 16, 43}. One study reported 100 percent of patients had rAOM and zero percent of patients had chronic OME⁴². Follow up times ranged from six months to 15 years. Study sample size ranged from 61 to 736 patients with a mean of 431 patients. Studies that reported sample size in terms of ears enrolled 108 to 2,327 ears with a mean of 954 ears. A median of 0.48 percent of patients (minimum 0.37%, maximum: 1.19%) experienced TT displacement. A median of 0.75 percent of ears (25th percentile: 0.7%, 75th percentile: 0.9%) experienced TT displacement.

Persistent perforations associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Persistent Perforations	Definition
Golz 10187945 US, Israel	retro cohort (1980- 1994)	93 standard polyethylene tubes, 7 Goode T tubes	4.20 (1.40) [0.83, 10.00]	55	91 [7.5]	at least 1 year after extrusion or removal	1360 [2604]	[3.06]	nr
Brown 8231117 US	cohort	Goode T-tubes	nr	nr	nr	6 months	168 [328]	[2.44]	perforations persisted in tympanic membranes after extraction
Debruyne 3799183 Belgium	cohort	nr	2.70+	55.4	nr	0.5 to 6 years	906 [1685]	[1.27]	perforations persisted > 6 months
Kokko 1267359 Finland	cohort (1965-1971)	nr	nr	nr	nr	3.167 years (average)	[290]	[1.72]	dry perforation (central 2-3 mm pars tensa defect); perforation with discharge
Tuli 23119801 India	cohort	nr	nr	66.7	0 [100]	nr	100	8.00	permanent perforation
Baarle 1169745 Netherlands	prosp cohort	Double-flanged, Silastic tubes (Richards)	nr	nr	nr	12+ weeks	60	1.67	perforation remained 2 months later
Birck 1267356 US	prosp cohort (1972- 1974)	nr	nr	59.2	nr	6+ months	736 [2327]	1.90	M.T. perforation
Carignan 17049144 Canada	prosp cohort (2003- 2004)	Goode T-tubes	5.70	62	71 [29]	18 months	[64]	1.79	perforations persisted > 6 months
Chevretton 3427802 UK	prosp cohort	Paparella II ventilation tubes	10.10 [6.10, 18.20]	nr	nr	6 months	36	2.78	nr
Chevretton 3427802 UK	prosp cohort	Paparella II ventilation tubes	10.10 [6.10, 18.20]	nr	nr	6 months	30	20.00	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Persistent Perforations	Definition
Costa 3472336 Brazil	prosp cohort	nr	nr	nr	0 [100]	nr	79	2.53	perforation of the eardrum
Daly 12759263 US	prosp cohort (1987- 1990)	nr	[0.50, 8.00]	61	nr	3 to 8 years	138 [275]	[67.64]	perforation (no tube)
De Beer 15224825 Netherlands	prosp cohort (1982- 1983)	nr	nr	47	nr	18 years	51 [101]	[5.94]	nr
De Beer 15224825 Netherlands	prosp cohort (1982- 1983)	nr	nr	48	nr	18 years	132 [258]	[1.16]	nr
Debruyne 3177616 Belgium	prosp cohort	grommets	4.92	nr	45.2 (ears) [54.8 (ears)]	until extrusion	906 [1685]	1.14	perforations persisted > 6 months
Eliachar 6613541 Israel	prosp cohort (1975- 1981)	Goode long- term T-shaped silicone design tubes	8.33 [4.50, 16.00]	nr	nr	8 to 72 months	122 [203]	[3.94]	permanent unhealed perforations
Fiebach 3570884 Germany	prosp cohort (1979- 1984)	nr	[1.00, 6.00]	60.5	nr	nr	534 [1000]	[0.94]	lasting perforation of the tympanic membrane
Fior 6526581 Italy	prosp cohort (1968- 1978)	Shepard type	3.00 [0.33, 6.00]	60.6	100 [0]	5 to 15 years	61 [108]	[5.56]	Persistent perforation of the tympanic membrane following extrusion of the tube
Florentzson 22648089 Sweden	prosp cohort (1/1996-12/1996)	Tympovent 0.9 mm diameter straight fluoroplastic tube from Atos Medical	3.90	61	nr	10 years	155 [280]	[2.1]	permanent perforations
Hampton 9118580 Ireland	prosp cohort	Armstrong ventilation tubes	[0.75, 10.25]	58.7	nr	17 months (mean)	109 [218]	[2.75]	tympanic membrane perforations
Khan 16773972 Pakistan	prosp cohort (2001- 2003)	nr	[2.00, 40.00]	66.6	0 [100]	18 to 24 months	57 [114]	2.63	nr
Levine 8179266 US	prosp cohort	Donaldson, Shephard, Paparella or Reuter/bobbin	[0.50, 8.00]	nr	0 [100]	4 years (mean)	149	14.09	tympanic membrane perforations
MacKinnon 4105168 UK	prosp cohort (1965- 1971)	nr	=<16.00	nr	nr	nr	95 [165]	[3.03]	perforation after removal of grommets

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Persistent Perforations	Definition
Mackenzie 6541254 UK	prosp cohort (1978- 1980)	Pappas 1974, Shah 1971 (Exmoor 142, Shepard 137, Bobbin 132, Arrow 58, Shah 131, Armstrong 138, Colar Button 141, Paparella 60)	10.80 [0.75, 77.00]	58.3	0 [100]	2.25 years	588 [939]	0.34	perforation at long term f/u
Muenker 6778334 Germany	prosp cohort (1966- 1978)	nr	nr	nr	nr	nr	631 [1060]	[2.45]	nr
Pereira 16446953 Brazil	prosp cohort (2001- 2002)	Short-term ventilation tubes, made of silicone, measuring 1.2 x 2.6 mm, type Donaldson	2.89 (1.54) [0.92, 9.33]	60	69.3 [30.7]	38 months	75 [150]	[2.05]	nr
Plotkin 7195446 US	prosp cohort (1977- 1979)	Castelli membrane, Donaldson design, silicone tube (Xomed XO-1201)	5.20 [2.50, 11.00]	60.7	0 [100]	nr	89 [162]	[2.00]	perforation for ≥ 6 months
Postma 9350484 US	prosp cohort (1988- 1991)	Armstrong grommt or straight Armstrong	nr	nr	nr	until extruded	346	5.20	nr
Powell 25598389 UK	prosp cohort (2004- 2005)	nr	4.60	nr	nr	9 weeks to 10 years	89	6.67	nr
Rothera 4040147 UK	prosp cohort (1980- 1982)	Xomed silicone Goode T-Tubes (1.1 mm. internal diameter, 12 mm. length)	nr	nr	0 [100]	30 months	73 [131]	[3.82]	central perforations
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	2.40	

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Persistent Perforations	Definition
Siddiqui 9225174 UK	prosp cohort (1987- 1992)	Mangat tube (Xomed)	mode 5.00 [0.50, 14.00]	61.8	0 [100]	3 years	191 [322]	[5.28]	perforation at a year follow-up
Suetake 2239252 Japan	prosp cohort (1986- 1987)	nr	6.20 (2.00) [3.00, 11.00]	59.6	0 [100]	nr	52 [90]	[14.55]	nr
Tos 985199 Denmark	prosp cohort	nr	nr	14	nr	1 to 8 years	109	2.75	nr
Valtonen 10435125 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	281 [281]	[2.49]	nr
Valtonen 12150521 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	47 [47]	[0]	nr
Valtonen 12150521 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	281 [281]	[4.63]	nr
Valtonen 15837895 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube	15.10 [14.10, 15.90]	57	33.3 [66.7]	14.0 to 14.8 years	237 [237]	[1.69]	nr
Valtonen 15837896 Finland	prosp cohort (1983- 1984)	nr	15.10 [14.10, 15.90]	57.1	nr	14 years	237 [237]	[1.27]	nr
Valtonen 16094135 Finland	prosp cohort (1983- 1993)	Shah vent Teflon tube (Xomed)	nr	51.4	0 [100]	5 to 7.2 years	72 [124]	6.94	nr
Van Cauwenberge 576016 Belgium	prosp cohort	nr	[2.00, 14.00]	49.3	0 [100]	5 to 120 months	148	2.70	
Walker 9287928 Australia	prosp cohort	Shepard grommet, Shah vent tube, Sheehy collar button vent tube	3.80	nr	12 [85]	until extrusion	106	[0.47]	nr
Weigel 2645490 US	prosp cohort (1983- 1984)	Goode T-tubes, Armstrong Teflon, Reuter- Bobbin Stainless Steel,	3.80 [0.60, 13.00]	59	45 [41]	21 months	75 [150]	[6.00]	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Persistent Perforations	Definition
		Shepard Teflon							
De Beer 16151352 Netherlands	prosp ncrs	[positive history of otitis media and no ventilation tube insertion]	nr	nr	nr	16 years	224	[1.34]	at 18 years old
De Beer 16151352 Netherlands	prosp ncrs	[positive history of otitis media and ventilation tube insertion]	nr	nr	nr	16 years	59	[6.78]	at 18 years old
Smillie 25171763 Scotland	nr cs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	6.67	tympanic membrane perforation
Smillie 25171763 Scotland	nr cs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	5.00	tympanic membrane perforation
Hormann -Iowa- Kollectiv 1816937 Germany	prosp nr cs	[cleft palate]	7.43 [5.00, 10.00]	nr	nr	8 years	126 [252]	8.73	9 perforation
Hormann -Iowa- Kollectiv 1816937 Germany	prosp nr cs	nr	14.70 [11.00, 19.00]	nr	nr	nr	58 [116]	[9.48]	eardrum perforation at the time of followup
Veletic 21397957 Croatia	prosp nr cs (2004- 2009)	nr	5.44 [2.00, 12.00]	nr	0 [100]	nr	[161]	[0]	eardrum perforation
Klockars 22796197 Finland	rct	[closure of the lip at the age of 3-4 months and closure of the hard and soft palate at the age of 12 months]	[0.25, 0.33]	62	nr	nr	44	2.70	tympanic membrane perforation
Klockars 22796197 Finland	rct	[closure of the lip and soft palate at the age of 3-4 months and	[0.25, 0.33]	62	nr	nr	49	[1.19]	tympanic membrane perforation

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Persistent Perforations	Definition
		closure of the hard palate at the age of 12 months]							
De Eredità 16406076 Italy	prosp rct (2001- 2003)	Teflon Shah mini vent1 tube [Myringotomy with tube insertion (M&T)]	3.70 [2.00, 6.00]	nr	0 [100]	1 year	15	0	persistent TM perforation after 1 year
De Eredità 16406076 Italy	prosp rct (2001- 2003)	Teflon Shah mini vent1 tube [contact-diode laser myringotomy only (CDLM)]	3.70 [2.00, 6.00]	nr	0 [100]	1 year	15	6.67	persistent TM perforation after 1 year
Gates 3683478 US	prosp rct (1980- 1984)	Shepherd tubes [TT and TT+ adenoidectomy arms]	[4.00, 8.00]	59	0 [100]	2 years	253	1.19	persistent unilateral perforation of the tympanic membrane
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT nontrial; underwent TT insertion at parents' discretion]	5.00	52.6	0 [100]	~2 years	6 [12]	0 [0]	perforation with or without other abnormality
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT late treatment; underwent TT insertion 6-9 months after initiation of symptoms]	5.00	52.6	0 [100]	~2 years	51 [102]	3.92 [1.96]	perforation with or without other abnormality
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT early treatment; underwent TT insertion at initiation of symptoms]	5.00	52.6	0 [100]	~2 years	121 [242]	4.96 [2.48]	perforation with or without other abnormality

Forty-eight studies^{5, 8, 10, 12, 14, 16, 17, 19, 21, 23-25, 27-29, 34-36, 39-68} (representing 58 cohorts) report on persistent perforations associated with placement of tympanostomy tubes (TT). Forty studies were cohorts^{5, 8, 12, 14, 16, 19, 21, 23, 25, 27-29, 34-36, 39-42, 44-47, 49, 50, 52-54, 56-67} (35 prospective^{5, 8, 12, 14, 16, 19, 21, 23, 25, 27, 29, 34, 36, 40-42, 44-47, 50, 52, 54, 56-67}, 1 retrospective⁵³), four studies were non-randomized comparative studies^{17, 48, 55, 68}, and four studies employed a randomized control trial design^{10, 24, 43, 51}. Years of recruitment range from 1965 to 2012. Patient age ranged from 0.25 to 77 years, as reported by 35 studies^{8, 10, 12, 14, 16, 17, 19, 21, 24, 25, 27, 29, 34, 36, 41-45, 49-57, 60, 61, 64-68} (34 of the 35 studies reported a maximum age \leq 19 years^{8, 10, 14, 16, 17, 19, 21, 24, 25, 27, 29, 34, 36, 41-45, 49-57, 60, 61, 64-68}). Percentages of males enrolled in these studies ranged from 14 to 66.7 percent with a mean of 56.4 percent, as reported in 30 studies^{5, 10, 12, 16, 17, 21, 24, 25, 27, 29, 34, 39, 41-44, 47, 49, 52-54, 57, 60-67}. Twenty-six studies reported on average 19 percent (range: 0-100%) of patients had recurrent acute otitis media (rAOM) and on average 80.4 percent (range: 0-100%) had chronic otitis media with effusion (OME)^{12, 16, 19, 21, 24, 25, 27, 34, 39, 42-44, 46, 50, 51, 53, 56, 57, 59-61, 63, 65-68}. Follow up times ranged from twelve weeks to 14.8 years or until tube extrusion. Study sample size ranged from 6 to 1,360 patients with a mean of 202 patients. Studies that reported sample size in terms of ears enrolled 12 to 2,604 ears with a mean of 455 ears. A median of 2.75 percent of patients (25th percentile: 1.8%, 75th percentile: 6.7%) experienced persistent perforations. A median of 2.45 percent of ears (25th percentile: 1.3%, 75th percentile: 4.6%) experienced persistent perforation.

Myringosclerosis associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Myringosclerosis	Definition
Ahmet 11271428 Turkey	prosp cohort (1988- 1997)	Paparella type- 1, type-2, Shepard Grommet or Modified T tympanostomy tubes	nr	58	nr	nr	251 [431]	[49.88]	nr
Birck 1267356 US	prosp cohort (1972- 1974)	nr	nr	59.2	nr	6+ months	736 [2327]	0.95	tympanosclerosis (43 tube insertions)
Chevretton 3427802 UK	prosp cohort	Paparella II ventilation tubes	10.10 [6.10, 18.20]	nr	nr	6 months	36	80.56	nr
Chevretton 3427802 UK	prosp cohort	Paparella II ventilation tubes	10.10 [6.10, 18.20]	nr	nr	6 months	30	70.00	nr
Daly 12759263 US	prosp cohort (1987- 1990)	nr	[0.50, 8.00]	61	nr	3 to 8 years	138 [275]	[49.82]	myringosclerosis
De Beer 15224825 Netherlands	prosp cohort (1982- 1983)	nr	nr	47	nr	18 years	51 [101]	[64.36]	nr
De Beer	prosp cohort (1982-	nr	nr	48	nr	18 years	132 [258]	[8.91]	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Myringosclerosis	Definition
15224825 Netherlands	1983)								
Fiebach 3570884 Germany	prosp cohort (1979- 1984)	nr	[1.00, 6.00]	60.5	nr	nr	534 [1000]	[11.29]	scarring or calcification
Friedman 11551611 US	prosp cohort	nr	[0.08, 30.00]	60.1	nr	nr	137	12.41	nr
Friedman 11551611 US	prosp cohort	nr	[0.08, 30.00]	60.1	nr	nr	81	34.57	tympanosclerosis in at least one ear
Gundersen 1267702 Norway	prosp cohort	polyethylene ventilating tube	7.50 [1.00, 14.00]	nr	0 [100]	2 to 11 years	100 [196]	[11.22]	nr
Khan 16773972 Pakistan	prosp cohort (2001- 2003)	nr	[2.00, 40.00]	66.6	0 [100]	18 to 24 months	57 [114]	[5.26]	nr
Mackenzie 6541254 UK	prosp cohort (1978- 1980)	Pappas 1974, Shah 1971 (Exmoor 142, Shepard 137, Bobbin 132, Arrow 58, Shah 131, Armstrong 138, Colar Button 141, Paparella 60)	10.80 [0.75, 77.00]	58.3	0 [100]	2.25 years	588 [939]	0.68	tympanosclerosis at long term f/u
Pereira 16446953 Brazil	prosp cohort (2001- 2002)	Short-term ventilation tubes, made of silicone, measuring 1.2 x 2.6 mm, type Donaldson	2.89 (1.54) [0.92, 9.33]	60	69.3 [30.7]	38 months	75 [150]	[2.74]	nr
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	37.98	after extrusion of the VT
Slack 6470572 UK	prosp cohort	Shepard grommet	[4.00, 10.00]	nr	nr	21 months	124	56.45	tympanosclerosis
Stenstrom 16330739 Canada	prosp cohort (1985- 1989)	83 in surgical group received T-type VTs	11.60 (4.30)	60	nr	6 to 10 years	38	65.79	nr
Stenstrom 16330739 Canada	prosp cohort (1985- 1989)	83 in surgical group received T-type VTs	12.30 (3.80)	52	nr	6 to 10 years	27	14.81	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Myringosclerosis	Definition
Tos 3814387 Denmark	prosp cohort (1970-1975)	nr	nr	nr	nr	nr	278 [527]	33.45	tympanosclerosis
Tos 985199 Denmark	prosp cohort	nr	nr	14	nr	1 to 8 years	109	22.94	diffuse tympanosclerosis
Valtonen 15837896 Finland	prosp cohort (1983-1984)	nr	15.10 [14.10, 15.90]	57.1	nr	14 years	237 [237]	1.27	tympanosclerosis (patients 16, 127, 133)
Daly 9738746 US	cross-sectional (1985-1990)	[children treated with TT]	17.70 (3.50) [13.00, 28.00]	61	0 [100]	nr	108	61.00	8- to 12-year-olds
De Beer 16151352 Netherlands	prosp ncrs	[positive history of otitis media and no ventilation tube insertion]	nr	nr	nr	16 years	224	8.93	at 18 years
De Beer 16151352 Netherlands	prosp ncrs	[positive history of otitis media and ventilation tube insertion]	nr	nr	nr	16 years	59	55.93	at 18 years
Smillie 25171763 Scotland	nrcs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	0	tympanosclerosis
Smillie 25171763 Scotland	nrcs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	5.00	tympanosclerosis
Luo 25465449 China	prosp nrcs (2011-2012)	[tympanostomy tube insertion]	4.80 (1.00) [2.00, 8.00]	50.9	nr	2 years	55	34.55	myringosclerosis
Velepik 21397957 Croatia	prosp nrcs (2004-2009)	nr	5.44 [2.00, 12.00]	nr	0 [100]	nr	[161]	[26.09]	myringosclerosis (There was no significant difference in the incidence of myringosclerosis between the two groups (chi-square = 0.171; ss = 1; p = 0.680))
Dawes 1742892 UK	prosp rct	Shah pattern tube [only sufficient effusion was aspirated to	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	[51.43]	tympanosclerosis

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Myringosclerosis	Definition
		provide clearly vie of the myringotomy]							
Dawes 1742892 UK	prosp rct	Shah pattern tube [effort was made to aspirate all of the effusion using the fine end (20 gauge) of a Zoellner sucker which was inserted through the incision]	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	[42.86]	tympanosclerosis
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT nontrial; inderwent TT insertaion at parents' discretion]	5.00	52.6	0 [100]	~2 years	6 [12]	0 [0]	tympanosclerosis
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT late treatment; underwent TT insertion 6-9 months after initiaition of symptoms]	5.00	52.6	0 [100]	~2 years	51 [102]	5.88 [9.80]	tympanosclerosis
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT early treatment; underwent TT insertion at initiaition of symptoms]	5.00	52.6	0 [100]	~2 years	121 [242]	3.31 [4.13]	tympanosclerosis

Twenty-four studies^{5, 6, 11, 12, 16, 17, 24, 29, 34, 41, 45, 47, 48, 57, 62, 64, 68-75} (representing 33 cohorts) report on myringosclerosis associated with placement of tympanostomy tubes (TT). Seventeen studies were prospective cohorts^{5, 12, 16, 29, 34, 41, 45, 47, 57, 62, 64, 70-75}, and one study employed a cross-sectional design⁶⁹, four studies were nonrandomized comparative studies^{11, 17, 48, 68}, and two studies employed a

randomized control trial design^{6, 24}. Years of recruitment range from 1965 to 2011. Patient age ranged from 0.08 to 77, as reported by 18 studies^{6, 11, 12, 16, 17, 24, 29, 34, 41, 45, 57, 64, 68-71, 73, 74} (15 of the 18 studies reported a maximum age ≤ 19 years^{6, 11, 16, 17, 24, 29, 41, 45, 57, 64, 68, 70, 71, 73, 74}). Percentages of males enrolled in these studies ranged from 14 to 66.6 percent with a mean of 54.3 percent^{5, 6, 11, 12, 16, 17, 24, 29, 34, 41, 47, 57, 62, 64, 69, 70, 74}. Seven studies reported zero percent of patients had recurrent acute otitis media (rAOM) and 100 percent of patients had chronic otitis media with effusion (OME)^{12, 16, 24, 34, 68, 69, 71}. One study reported 69.3 percent of patients had rAOM and 30.7 percent of patients had chronic OME⁵⁷. Follow up times ranged from six months to 16 years. Study sample size ranged from 6 to 736 patients with a mean of 150 patients. Studies that reported sample size in terms of ears enrolled 12 to 2,327 ears with a mean of 399 ears. A median of 18.9 percent of patients (25th percentile: 3.3%, 75th percentile: 55.9%) experienced myringosclerosis. A median of 11.3 percent of ears (25th percentile: 5.3%, 75th percentile: 49.8%) experienced myringosclerosis.

Atrophy, atelectasis or retraction associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Atrophy Atelectasis Retraction	Definition
Bonding 4215997 US	cohort (1967-1969)	nr	[=<3.00, 4.00]	66.7	0 [100]	16 to 48 months	108 [175]	13.89	diffuse atrophy of the tympanic membrane
Bonding 4702615 Denmark	cohort	grommets	nr	66.7	0 [100]	nr	117 [188]	8.55	atrophic drum
Daly 12759263 US	prosp cohort (1987- 1990)	nr	[0.50, 8.00]	61	nr	3 to 8 years	138 [275]	[66.18]	atrophy
Eliachar 6613541 Israel	prosp cohort (1975- 1981)	Goode long- term T-shaped silicone design tubes	8.33 [4.50, 16.00]	nr	nr	8 to 72 months	122 [203]	100	retraction pockets (75 in the attic, 82 - both in the attic and posterior superior quadrant and 38 had other variations)
Fior 6526581 Italy	prosp cohort (1968- 1978)	Shepard type	3.00 [0.33, 6.00]	60.6	100 [0]	5 to 15 years	61 [108]	[5.56]	tympanic atrophy
Li 10547462 US	prosp cohort (1987- 1991)	Donaldson tubes, Reuter Bobbin tubes, Shepard tubes or other	nr	57	0 [100]	4 to 6 years	109 [214]	42.86	severe pars tensa retraction
Pereira 16446953 Brazil	prosp cohort (2001- 2002)	Short-term ventilation tubes, made of silicone, measuring 1.2 x 2.6 mm, type Donaldson	2.89 (1.54) [0.92, 9.33]	60	69.3 [30.7]	38 months	75 [150]	39.73	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Atrophy Atelectasis Retraction	Definition
Powell 25598389 UK	prosp cohort (2004- 2005)	nr	4.60	nr	nr	9 weeks to 10 years	89	12.00	otolaryngology-clinic- diagnosed tympanic membrane retraction pocket
Praveen 15992470 UK	prosp cohort (1998- 2003)	Shah ventilation tubes	5.00 [1.60, 14.50]	64	nr	nr	606 [1174]	[4.43]	attic reaction post- operatively
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	27.88	tympanic membrane atrophy
Tos 3814387 Denmark	prosp cohort (1970- 1975)	nr	nr	nr	nr	nr	278 [527]	[14.36]	atrophy
Tos 985199 Denmark	prosp cohort	nr	nr	14	nr	1 to 8 years	109	5.50	Adhesive otitis with retracted, immobile drum, an entirely or partially atelectatic middle ear, and poor tubal function
Valtonen 12150521 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	47 [47]	10.64	retraction of pars flaccida (3); retraction of pars tensa (2)
Valtonen 12150521 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	281 [281]	16.73	retraction of pars flaccida (20); retraction of pars tensa (27)
Valtonen 15837895 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube	15.10 [14.10, 15.90]	57	33.3 [66.7]	14.0 to 14.8 years	237 [237]	[21.94]	TM retractions
Valtonen 15837896 Finland	prosp cohort (1983- 1984)	nr	15.10 [14.10, 15.90]	57.1	nr	14 years	237 [237]	[2.95]	TM retraction
Valtonen 16094135 Finland	prosp cohort (1983- 1993)	Shah vent Teflon tube (Xomed)	nr	51.4	0 [100]	5 to 7.2 years	72 [124]	12.50	pars tensa retraction of tympanic membrane
Daly 9738746 US	cross-sectional (1979-1985)	[adolescents and young adults treated with TT]	6.40 (1.30) [5.00, 12.00]	63	0 [100]	nr	150	18.00	severe TM retraction
Daly 9738746 US	cross-sectional (1985-1990)	[children treated with TT]	17.70 (3.50) [13.00, 28.00]	61	0 [100]	nr	108	4.00	severe TM retraction

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Atrophy Atelectasis Retraction	Definition
De Beer 16151352 Netherlands	prosp ncrs	[positive history of otitis media and no ventilation tube insertion]	nr	nr	nr	16 years	224	6.70	atrophy at 18 years
De Beer 16151352 Netherlands	prosp ncrs	[positive history of otitis media and ventilation tube insertion]	nr	nr	nr	16 years	59	20.34	atrophy at 18 years
Smillie 25171763 Scotland	nrcs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	0	attic retraction
Smillie 25171763 Scotland	nrcs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	2.33	retracted tympanic membrane; attic retraction
Hormann -Iowa- Kollectiv 1816937 Germany	prosp nrcs	[cleft palate]	7.43 [5.00, 10.00]	nr	nr	8 years	126 [252]	6.35	retraction and atrophy
Velepici 21397957 Croatia	prosp nrcs (2004- 2009)	nr	5.44 [2.00, 12.00]	nr	0 [100]	nr	[161]	[3.11]	Severe Attic retractions
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT nontrial; underwent TT insertion at parents' discretion]	5.00	52.6	0 [100]	~2 years	6 [12]	[66.67]	segmental atrophy
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT late treatment; underwent TT insertion 6-9 months after initiation of symptoms]	5.00	52.6	0 [100]	~2 years	51 [102]	[30.39]	segmental atrophy
Paradise 11309632 US	prosp rct (1991- 1995)	Armstrong [TT early treatment; underwent TT insertion at initiation of	5.00	52.6	0 [100]	~2 years	121 [242]	[40.08]	segmental atrophy

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Atrophy Atelectasis Retraction	Definition
		symptoms]							

Twenty-two studies^{8, 14, 16, 17, 24, 29, 38, 42, 48, 55, 57, 62-66, 68, 69, 75-78} (representing 28 cohorts) report on atrophy atelectasis retraction associated with placement of tympanostomy tubes (TT). Sixteen studies were cohorts^{8, 14, 16, 29, 38, 42, 57, 62-66, 75-78} (14 prospective^{8, 14, 16, 29, 38, 42, 57, 62-66, 75, 78}), one study was cross-sectional⁶⁹, four studies were non-randomized comparative studies^{17, 48, 55, 68}, and one study employed a randomized control trial design²⁴. Years of recruitment range from 1967 to 2012. Patient age ranged from 0.33 to 28 years, as reported by 16 studies^{8, 14, 16, 17, 24, 29, 38, 42, 55, 57, 64-66, 68, 69, 77} (all but one cohort reported a maximum age ≤ 16 years). Percentages of males enrolled in these studies ranged from 14 to 66.7 percent with a mean of 56.2 percent^{16, 17, 24, 29, 38, 42, 57, 62-66, 69, 76-78}. Twelve studies reported on average 16.9 percent (range: 0-100%) of patients had recurrent acute otitis media (rAOM) and on average 83.1 percent (range: 0-100%) had chronic otitis media with effusion (OME)^{16, 24, 42, 57, 63, 65, 66, 68, 69, 76-78}. Follow up times ranged from nine weeks to 14.8 years. Study sample size ranged from 6 to 606 patients with a mean of 143 patients. Studies that reported sample size in terms of ears enrolled 12 to 1,174 ears with a mean of 248 ears. A median of 12.25 percent of patients (25th percentile: 6.4%, 75th percentile: 20.3%) experienced atrophy atelectasis retraction. A median of 18.2 percent of ears (25th percentile: 4.4%, 75th percentile: 40.1%) experienced atrophy atelectasis retraction.

Cholesteotoma associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Cholesteotoma	Definition
Djurhuus 25724629 Denmark	retro cohort (1997- 2011)	nr	nr	nr	nr	nr	217206	0.17	first-time surgically treated middle ear cholesteatoma
Golz 10406312 Israel	retro cohort (1978- 1997)	"homemade" polyethylene tubes in 5143 ears, Goode T- tubes in 432 ears	4.80 (2.60) [1.20, 14.00]	54.4	11.4 (ears) [88.6 (ears)]	1 to 20 years	2829 [5575]	2.19	developed behind an intact drum or next to a perforation at or near the site of the tube insertion, in the mesotympanum or hypotympanum; diagnosis was made according to microscopic findings on examination of the drum by CT of the ears and was confirmed in all of

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Cholesteatoma	Definition
									the patients during surgery on the affected ears
Spilsbury 23737350 Australia	retro cohort (1980-2009)	nr	nr	59.7	nr	11.9 years	56949	1.04	nr
Bonding 4215997 US	cohort (1967-1969)	nr	[=<3.00, 4.00]	66.7	0 [100]	16 to 48 months	108 [175]	1.85	suppurative otitis media with cholesteatoma
Kokko 1267359 Finland	cohort (1965-1971)	nr	nr	nr	nr	3.167 years (average)	[290]	[0.69]	attic cholesteatoma
Tos 7192477 Denmark	cohort	Armstrong tube	nr	nr	0 [100]	6 months	[527]	0.20	deep retraction pocket, the bottom of which could not be seen
Birck 1267356 US	prosp cohort (1972-1974)	nr	nr	59.2	nr	6+ months	736 [2327]	[0]	nr
Eliachar 6613541 Israel	prosp cohort (1975-1981)	Goode long-term T-shaped silicone design tubes	8.33 [4.50, 16.00]	nr	nr	8 to 72 months	122 [203]	[1.48]	developed cholesteatoma in their pre-existing retractions pockets
Gundersen 1267702 Norway	prosp cohort	polyethylene ventilating tube	7.50 [1.00, 14.00]	nr	0 [100]	2 to 11 years	100 [196]	[5.61]	cholesteatoma
Heaton 8877228 UK	prosp cohort (1986-1988)	nr	5.00 [1.00, 12.00]	60.6	0 [100]	nr	127	0.79	a very extensive cholesteatoma involving the attic, middle ear, mastoid process and Eustachian tube was found at surgery. It seems unlikely, therefore, that the grommet caused the choesteatoma.
MacKinnon 4105168 UK	prosp cohort (1965-1971)	nr	=<16.00	nr	nr	nr	95 [165]	6.32 [4.85]	cholesteatoma after previous exudative otitis media
Muenker 6778334 Germany	prosp cohort (1966-1978)	nr	nr	nr	nr	nr	631 [1060]	1.58	preexisting cholesteatoma was revealed behind an intact tympanic membrane on 3 occasions
Pereira	prosp cohort (2001-	Short-term	2.89 (1.54)	60	69.3 [30.7]	38 months	75 [150]	[0]	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Cholesteotoma	Definition
16446953 Brazil	2002)	ventilation tubes, made of silicone, measuring 1.2 x 2.6 mm, type Donaldson	[0.92, 9.33]						
Powell 25598389 UK	prosp cohort (2004- 2005)	nr	4.60	nr	nr	9 weeks to 10 years	89	1.33	otolaryngology-clinic- diagnosed cholesteatoma
Rothera 4040147 UK	prosp cohort (1980- 1982)	Xomed silicone Goode T-Tubes (1.1 mm. internal diameter, 12 mm. length)	nr	nr	0 [100]	30 months	73 [131]	0	nr
Tos 3814387 Denmark	prosp cohort (1970- 1975)	nr	nr	nr	nr	nr	278 [527]	[0.28]	attic cholesteatoma
Tos 985199 Denmark	prosp cohort	nr	nr	14	nr	1 to 8 years	109	1.83	cholesteatoma in the attic
Valtonen 15837895 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube	15.10 [14.10, 15.90]	57	33.3 [66.7]	14.0 to 14.8 years	237 [237]	0.42	retraction progressed to cholesteatoma
Smillie 25171763 Scotland	nracs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	0	posterior pars tensa cholesteatoma
Smillie 25171763 Scotland	nracs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	3.33	posterior pars tensa cholesteatoma
Hormann -lowa- Kollectiv 1816937 Germany	prosp nracs	[cleft palate]	7.43 [5.00, 10.00]	nr	nr	8 years	126 [252]	0	cholesteotoma
Hormann -lowa- Kollectiv 1816937 Germany	prosp nracs	nr	14.70 [11.00, 19.00]	nr	nr	nr	58 [116]	0	cholesteotoma
Luo 25465449 China	prosp nracs (2011- 2012)	[tympanostomy tube insertion]	4.80 (1.00) [2.00, 8.00]	50.9	nr	2 years	55	10.91	cholesteatoma in the attic
Gates 3683478	prosp rct (1980-	Shepherd tubes	[4.00, 8.00]	59	0 [100]	2 years	253	0	cholesteotoma formation

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Cholesteotoma	Definition
US	1984)	[TT and TT+ adenoidectomy arms]							
Paradise 2181158 US	prosp rct/nrcs (1971-1985)	[underwent adenoidectomy (some control subjects received adenoidectomy but not included in N_patients)]	nr	67	nr	nr	97	0.80	nr

Twenty-three^{5, 8, 11, 14, 17, 23, 32, 35-37, 43, 55, 57, 59, 62, 65, 71, 75, 77, 79-82} studies (representing 25 cohorts) report on cholesteotoma associated with placement of tympanostomy tubes (TT). Eighteen studies were cohorts^{5, 8, 14, 23, 32, 35, 36, 57, 59, 62, 65, 71, 75, 77, 79-82} (12 prospective^{5, 8, 14, 23, 32, 36, 57, 59, 62, 65, 71, 75}, 3 retrospective⁷⁹⁻⁸¹), three studies were nonrandomized comparative studies^{11, 17, 55}, one study was a randomized control trial design⁴³, and one study employed both an NRCS and RCT design³⁷. Years of recruitment range from 1965 to 2012. Patient age ranged from 0.6 to 19 years, as reported by 13 studies^{8, 11, 14, 17, 32, 36, 43, 55, 57, 65, 71, 77, 80}. Percentages of males enrolled in these studies ranged from 14 to 67 percent with a mean of 55.3 percent^{5, 11, 17, 32, 37, 43, 57, 62, 65, 77, 80, 81}. Nine studies reported zero to 69.3 percent of patients had recurrent acute otitis media (rAOM) and 30.7 to 100 percent of patients had chronic otitis media with effusion (OME)^{32, 43, 57, 59, 65, 71, 77, 80, 82}. Follow up times ranged from six months to twenty years. Study sample size ranged from 55 to 217,206 patients with a mean of 12,195 (median: 237) patients. Studies that reported sample size in terms of ears enrolled 116 to 5,575 ears with a mean of 796 ears. A median of 0.8 percent of patients (25th percentile: 0%, 75th percentile: 1.9%) experienced cholesteotoma. A median of 0.7 percent of ears (25th percentile: 0%, 75th percentile: 4.9%) experienced cholesteotoma.

Hearing loss associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Hearing Loss	Definition
Brown 8231117 US	cohort	Goode T-tubes	nr	nr	nr	6 months	168 [328]	1.19	conductive hearing loss
Tuli 23119801 India	cohort	nr	nr	66.7	0 [100]	nr	100	8.00	worsening of hearing
Costa 3472336 Brazil	prosp cohort	nr	nr	nr	0 [100]	nr	79	1.27	unilateral sensorineural hearing loss
Daly 12759263	prosp cohort (1987-	nr	[0.50, 8.00]	61	nr	3 to 8 years	138 [275]	[91.27]	hearing loss

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Hearing Loss	Definition
US	1990)								
Gundersen 1267702 Norway	prosp cohort	polyethylene ventilating tube	7.50 [1.00, 14.00]	nr	0 [100]	2 to 11 years	100 [196]	[20.92]	hearing was not normal, varying from a pure-tone average (PTA) of 25 to 60 dB hearing level (PTA was measured as the mean hearing loss for the frequencies 500, 1,000 and 2,000 hertz.)
Isaacson 18722211 US	prosp cohort (1997- 2007)	Armstrong beveled grommet tube	[0.11, 21.00]	nr	nr	nr	[10000]	0.02	profound hearing loss, both were found to have Mondini malformations by CT
Mackenzie 6541254 UK	prosp cohort (1978- 1980)	Pappas 1974, Shah 1971 (Exmoor 142, Shepard 137, Bobbin 132, Arrow 58, Shah 131, Armstrong 138, Colar Button 141, Paparella 60)	10.80 [0.75, 77.00]	58.3	0 [100]	2.25 years	588 [939]	28.38	by audiometric assessment at 3 month
Owen 8436453 US	prosp cohort	Armstrong bevelled tube	2.08 [0.42, 4.00]	nr	nr	6 months	52 [98]	[7.94]	moderate hearing loss (27.5-50 dB)
Spielmann 18047760 UK	prosp cohort (2003- 2004)	nr	5.30 [0.83, 9.00]	61.4	18.8 [81.2]	3 months	84 (calculated) [195]	35.62	a mean hearing threshold greater than 20 dB
Stenstrom 16330739 Canada	prosp cohort (1985- 1989)	83 in surgical group received T-type VTs	11.60 (4.30)	60	nr	6 to 10 years	38	36.84	hearing loss >=15 dB
Stenstrom 16330739 Canada	prosp cohort (1985- 1989)	83 in surgical group received T-type VTs	12.30 (3.80)	52	nr	6 to 10 years	27	11.11	hearing loss >=15 dB
Valtonen 15837896 Finland	prosp cohort (1983- 1984)	nr	15.10 [14.10, 15.90]	57.1	nr	14 years	237 [237]	[5.49]	AC PTAs worse than 15 dB
Daly 9738746 US	cross-sectional (1979-1985)	[adolescents and young adults treated with TT]	6.40 (1.30) [5.00, 12.00]	63	0 [100]	nr	150	21.00	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	Hearing Loss	Definition
Daly 9738746 US	cross-sectional (1985-1990)	[children treated with TT]	17.70 (3.50) [13.00, 28.00]	61	0 [100]	nr	108	10.00	nr
Rakover 9176804 Israel	nracs	T tube, Paparella TT [TT: no ear drops]	[3.00, 8.00]	nr	nr	1 to 3 months	88	0	abnormal sensorineural hearing threshold (0 to 5 dB)
Rakover 9176804 Israel	nracs	T tube, Paparella TT [TT with ear drops (preventive dexamethasone, neomycin and polymyxin B)]	[3.00, 8.00]	nr	nr	1 to 3 months	358 [705]	0	abnormal sensorineural hearing threshold (0 to 5 dB)

Thirteen studies^{3, 12, 18, 28, 29, 39, 46, 64, 69, 71, 74, 83, 84} (representing 16 cohorts) report on hearing loss associated with placement of tympanostomy tubes (TT). Eleven studies were cohorts^{3, 12, 18, 28, 29, 39, 46, 64, 71, 74, 83} (9 prospective^{3, 12, 18, 29, 46, 64, 71, 74, 83}), one study was cross-sectional⁶⁹, and one study was a nonrandomized comparative study⁸⁴. Years of recruitment range from 1978 to 2007. Patient age ranged from 0.42 to 77 years, as reported by 10 studies^{3, 12, 18, 29, 64, 69, 71, 74, 83, 84} (9 of the 10 studies reported a maximum age \leq 15.9 years^{3, 18, 29, 64, 69, 71, 74, 83, 84}). Percentages of males enrolled in these studies ranged from 52 to 66.7 percent with a mean of 60.1 percent^{3, 12, 18, 28, 29, 39, 46, 64, 69, 71, 74, 83, 84}. Six studies reported zero to 18.8 percent of patients had recurrent acute otitis media (rAOM) and 81.2 to 100 percent of patients had chronic otitis media with effusion (OME)^{12, 18, 39, 46, 69, 71}. Follow up times ranged from three months to fourteen years. Study sample size ranged from 27 to 588 patients with a mean of 155 patients. Studies that reported sample size in terms of ears enrolled 98 to 10,000 ears with a mean of 1,442 ears. A median of 9 percent of patients (25th percentile: 0.6%, 75th percentile: 24.7%) experienced hearing loss. A median of 14.4 percent of ears (25th percentile: 6.7%, 75th percentile: 56.1%) experienced hearing loss.

Otorrhea associated with TT placement

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
Golz 10187945 US, Israel	retro cohort (1980- 1994)	93% standard polyethylene	4.20 (1.40) [0.83, 10.00]	55	91 [7.5]	at least 1 year after extrusion	1360 [2604]	10.45	3 or more episodes

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
		tubes, 7% Goode T tubes				or removal			
van Dongen 23874870 Netherlands	retro cohort (2009- 2011)	nr	4.40 (2.30)	58	nr	nr	1184	67.00	one or more episodes in first year after TT placement
Brown 8231117 US	cohort	Goode T-tubes	nr	nr	nr	6 months	168 [328]	52.38	infections
Debruyne 3799183 Belgium	cohort	nr	2.70+	55.4	nr	0.5 to 6 years	906 [1685]	14.90 [10.45]	otorrhea
Jung 19715725 Korea	cohort (2004-2008)	nr	4.50 (2.20) [2.00, 7.00]	65.7	0 [100]	6 to 24 months	289	23.18	posttympanostomy tube otorrhea: active otorrhea from middle ear cavity through tympanostomy tube
Tuli 23119801 India	cohort	nr	nr	66.7	0 [100]	nr	100	12.00	excessive bleeding
Ah-Tye 11389239 US	prosp cohort (1992- 1996)	Teflon, Armstrong-type tube	1.37 [0.50, 3.00]	59.5	nr	6 to 57 months	173	58.61	1st 24 months (time period from tube placement); diagnosis based on otoscopic visualization of discharge exuding through the tympanostomy tube lumen after (when necessary) gently cleansing the external auditory canal
Allen 16156910 US	prosp cohort (9/2001-11/2001)	Sheehy (0.12 cm diameter) tube	4 [0.75, 11.83]	68.1	74 [19.5]	2 weeks	112	17.86	nr
Brodsky 10591365 US	prosp cohort (1998- 1999)	nr	3.95 (5.09) [0.50, 23.67]	56.6	[75.8]	1 to 3 months	54 [96]	11.11	nr
Debruyne 3177616 Belgium	prosp cohort	grommets	4.92	nr	45.2 (ears) [54.8 (ears)]	until extrusion	906 [1685]	14.79 [10.45]	at least one episode of otorrhea
Gates 3128752 US	prosp cohort (1980- 1986)	Shepard-type tube (1.1 mm inner diameter)	[4.00, 8.00]	60.3	nr	nr	130	10.00	purulent liquid was unequivocally present in external auditory canal, regardless of whether a tube was

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
									present or not, not ocunting dried secretions or blood clots
Gates 3128752 US	prosp cohort (1980- 1986)	Shepard-type tube (1.1 mm inner diameter)	[4.00, 8.00]	60.3	nr	nr	155	32.26	purulent liquid was unequivocally present in external auditory canal, regardless of whether a tube was present or not, not ocunting dried secretions or blood clots
Gates 3128752 US	prosp cohort (1980- 1986)	Shepard-type tube (1.1 mm inner diameter)	[4.00, 8.00]	60.3	nr	nr	227	22.47	purulent liquid was unequivocally present in external auditory canal, regardless of whether a tube was present or not, not ocunting dried secretions or blood clots
Gates 3128752 US	prosp cohort (1980- 1986)	Shepard-type tube (1.1 mm inner diameter)	[4.00, 8.00]	60.3	nr	nr	115	7.83	purulent liquid was unequivocally present in external auditory canal, regardless of whether a tube was present or not, not ocunting dried secretions or blood clots
Gourin 10208683 US	prosp cohort (1995- 1997)	Silver oxide- impregnated Sheehy-type tympanostomy tubes	3.70 (2.90)	57.3	nr	12 months	630 [1254]	[0.04]	postoperative otorrhea including serous effusion, mucoid effusion, pus, blood
Heaton 8877228 UK	prosp cohort (1986- 1988)	nr	5.00 [1.00, 12.00]	60.6	0 [100]	nr	127	14.17	discharge via one or both of their tubes
Ida 19324425 US	prosp cohort	pressure equalization tube	[0.67, 4.00]	nr	0 [100]	16 months	50	4.00	nr
Levinson 6819525 US	prosp cohort		[1.00, 11.00+]	nr	nr	5 months	64 [124]	[1.61]	acute otitis media
Mandel 8085732 US	prosp cohort (1979- 1990)	Teflon Armstrong-type	3.60 [0.50, 12.00]	nr	nr	nr	246	50.00	nr
Marzouk	prosp cohort (2009- 2010)	nr	3.60 (1.80)	67.1	15.8 [51.3]	1 year	79	34.18	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
22183900 US	2010)		[0.90, 9.00]						
Owen 8436453 US	prosp cohort	Armstrong bevelled tube	2.08 [0.42, 4.00]	nr	nr	6 months	52 [98]	[28.21]	nr
O'Reilly 18594333 US	prosp cohort	nr	2.70 (2.40) [0.25, 17.00]	55.2	nr	6 months	509	70.33	Post tympanostomy tube otorrhea
Pereira 16446953 Brazil	prosp cohort (2001- 2002)	Short-term ventilation tubes, made of silicone, measuring 1.2 x 2.6 mm, type Donaldson	2.89 (1.54) [0.92, 9.33]	60	69.3 [30.7]	38 months	75 [150]	61.64	otorrhea at some time
Plotkin 7195446 US	prosp cohort (1977- 1979)	Castelli membrane, Donaldson design, silicone tube (Xomed XO- 1201)	5.20 [2.50, 11.00]	60.7	0 [100]	nr	89 [162]	12.36	purulent otitis media and serous otitis media
Powell 25598389 UK	prosp cohort (2004- 2005)	nr	4.60	nr	nr	9 weeks to 10 years	89	19.10	otorrhea at 9 weeks
Roos 2128487 Sweden	prosp cohort	polyethylene	4.00 [0.75, 8.00]	nr	0 [100]	1 month	65 [103]	[11.65]	signs of infection with discharge from tube
Rosenfeld 10807325 US	prosp cohort (1997- 1998)	short-acting grommet-type tubes, designed to extrude spontaneously within 6-18 months	med 1.40 [0.50, 9.90]	60	56 [42]	2 to 4 months	248	29.91	at first postoperative office visit
Rothera 4040147 UK	prosp cohort (1980- 1982)	Xomed silicone Goode T-Tubes (1.1 mm. internal diameter, 12 mm. length)	nr	nr	0 [100]	30 months	73 [131]	20.55	nr
Saki 24303379 Iran	prosp cohort (2009- 2011)	nr	[0.83, 6.00]	55.8	0 [100]	12 to 18 months	208	17.79	transient otorrhea; delayed otorrhea; chronic otorrhea non- responsive to medical treatment
Siddiqui 9225174 UK	prosp cohort (1987- 1992)	Mangat tube (Xomed)	mode 5.00 [0.50, 14.00]	61.8	0 [100]	3 years	191 [322]	13.09 [11.18]	had ear discharge on one or more occasions, requiring abx and

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
									eardrops
Spielmann 18047760 UK	prosp cohort (2003- 2004)	nr	5.30 [0.83, 9.00]	61.4	18.8 [81.2]	3 months	84 (calculated) [195]	14.29	nr
Suetake 2239252 Japan	prosp cohort (1986- 1987)	nr	6.20 (2.00) [3.00, 11.00]	59.6	0 [100]	nr	52 [90]	47.27	recurrence of SOM
Tavin 3372141 US	prosp cohort (1982- 1985)	Shepard Grommet Drain Tube, with wire (teflon); Canoe Ventilation Tube (teflon); Reuter Bobbin Drain Tube (metal); Spoon Bobbin Drain Tube, with wire (metal); Armstrong Beveled Drain Tube, plain end (teflon); Polyethylene Tube; Shea Ventilation Tube; Richard's Wing Tube, with outside flange and wire; Armstrong Beveled Drain Tube Grommet Type (teflon); Paparella-I Vent Tube (Biolite- coated silicone); Paparella-III (silicone); Shah Type (teflon); Pope Beveled Grommet (polyethylene);	4.80 (1.50) [0.33, 16.00]	63.2	nr	365 to 728 days	95 [187]	[9.09]	excluding post operative otorrhea

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
		Donaldson Type (silicone); Richard's T Tube (silicone)							
Valtonen 10435125 Finland	prosp cohort (1983- 1984)	Shah vent Teflon tube, inner diameter 1.1 mm	0.84 [0.42, 1.33]	58.4	34.2 [65.8]	5 years	281 [281]	[66.55]	post-tympanostomy otorrhea during primary ventilation tube
Valtonen 16094135 Finland	prosp cohort (1983- 1993)	Shah vent Teflon tube (Xomed)	nr	51.4	0 [100]	5 to 7.2 years	72 [124]	6.94	ongoing OME
Walker 9287928 Australia	prosp cohort	Shepard grommet, Shah vent tube, Sheehy collar button vent tube	3.80	nr	12 [85]	until extrusion	106	[7.08]	transient post-intubation otorrhea
Weigel 2645490 US	prosp cohort (1983- 1984)	Goode T-tubes, Armstrong Teflon, Reuter- Bobbin Stainless Steel, Shepard Teflon	3.80 [0.60, 13.00]	59	45 [41]	21 months	75 [150]	[35.33]	nr
Cannon 11797262 US	nrCs	Ultracil tube or regular Silastic tubes [underwent myringotomy with insertion of the Ultracil tube]	0.11	44	nr	14 days	50	8.00	nr
Cannon 11797262 US	nrCs	Ultracil tube or regular Silastic tubes [intubated with regular Silastic tubes]	0.11	61.6	nr	14 days	nr	16.30	nr
Smillie 25171763 Scotland	nrCs (2002-2012)	[cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	61.67	nr
Smillie 25171763 Scotland	nrCs (2002-2012)	[no cleft lip palate; underwent VT insertion]	med 3.50 [0.60, 10.40]	55	nr	nr	60	60.00	nr
Hormann -Iowa- Kollectiv	prosp nrCs	[cleft palate]	7.43 [5.00, 10.00]	nr	nr	8 years	126 [252]	10.32	chronic recurring OME through tubes

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
1816937 Germany									
Luo 25465449 China	prosp nracs (2011- 2012)	[tympanostomy tube insertion]	4.80 (1.00) [2.00, 8.00]	50.9	nr	2 years	55	32.73	otorrhea
Siegel 12161732 US	prosp nracs (1998- 2000)	Reuter bobbin tubes [underwent Laser Office Ventilation of Ears with Insertion of Tubes (LOVE IT)]	nr	nr	nr	1 week	35	2.86	don't know if >30 days
Siegel 12161732 US	prosp nracs (1998- 2000)	Reuter bobbin tubes [underwent standard cold surgical myringotomy and tube placement (M&T)]	nr	nr	nr	1 week	29	6.90	don't know if >30 days
Daly 8745020 US	prosp rct (1987- 1990)	Donaldson (silicone, inner diameter 1.14 mm), Reuter bobbin (fluoroplastic, inner diameter 1.0 mm), Shepard (fluoroplastic, inner diameter, 1.14 mm) [received trimethoprim- sulfamethoxazole and prednisone post- tympanostomy tube]	nr	63	nr	14 days	41	92.68	nr
Daly 8745020 US	prosp rct (1987- 1990)	Donaldson (silicone, inner	nr	63	nr	14 days	39	56.41	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
		diameter 1.14 mm), Reuter bobbin (fluoroplastic, inner diameter 1.0 mm), Shepard (fluoroplastic, inner diameter, 1.14 mm) [received placebo]							
Dawes 1742892 UK	prosp rct	Shah pattern tube [only sufficient effusion was aspirated to provide clearly vie of the myringotomy]	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	[16.00]	purulent discharge
Dawes 1742892 UK	prosp rct	Shah pattern tube [effort was made to aspirate all of the effusion using the fine end (20 gauge) of a Zoellner sucker which was inserted through the incision]	3.75 [1.08, 9.50]	50	nr	18 months	25 [50]	[8.00]	purulent discharge
De Eredità 16406076 Italy	prosp rct (2001-2003)	Teflon Shah mini vent1 tube [Myringotomy with tube insertion (M&T)]	3.70 [2.00, 6.00]	nr	0 [100]	1 year	15	26.67	episodes of otorrhea
De Eredità 16406076 Italy	prosp rct (2001-2003)	Teflon Shah mini vent1 tube [contact-diode laser myringotomy only (CDLM)]	3.70 [2.00, 6.00]	nr	0 [100]	1 year	15	13.33	episodes of otorrhea

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
Gates 2492178 US	prosp rct	Shepard-type [myringotomy + TT]	[4.00, 8.00]	58	nr	2 years	129	28.68	purulent otorrhea >=1 episode
Gates 2492178 US	prosp rct	Shepard-type [myringotomy]	[4.00, 8.00]	61	nr	2 years	107	22.43	purulent otorrhea >=1 episode
Gates 2492178 US	prosp rct	Shepard-type [myringotomy + adenoidectomy]	[4.00, 8.00]	59	nr	2 years	130	11.54	purulent otorrhea >=1 episode
Gates 2492178 US	prosp rct	Shepard-type [myringotomy + adenoidectomy + TT]	[4.00, 8.00]	58	nr	2 years	125	24.00	purulent otorrhea >=1 episode
Gates 3683478 US	prosp rct (1980- 1984)	Shepherd tubes [TT and TT+ adenoidectomy arms]	[4.00, 8.00]	59	0 [100]	2 years	253	20.95	acute purulent otorrhea
Ingels 16429748 Netherlands	prosp rct (1996- 1997)	Bevel Bobbins, Entermed BV, The Netherlands [watchful waiting]	0.14 (0.01)	58.8	0 [100]	1 year	94	38.30	nr
Ingels 16429748 Netherlands	prosp rct (1996- 1997)	Bevel Bobbins, Entermed BV, The Netherlands [TT]	0.14 (0.01)	58.8	0 [100]	1 year	93	82.80	nr
Poetker 17178938 US	prosp rct (2002- 2003)	Teflon-coated, fluoroplastic Armstrong beveled TT [receiving ofloxacin otic drops]	1.88 [0.50, 6.67]	55	nr	2 weeks	99 [198]	[8.08]	nr
Poetker 17178938 US	prosp rct (2002- 2003)	Teflon-coated, fluoroplastic Armstrong beveled TT [no postoperative otic drop prophylaxis]	1.88 [0.67, 12.00]	55	nr	2 weeks	87 [174]	[14.94]	nr
Poetker 17178938 US	prosp rct (2002- 2003)	Teflon-coated, fluoroplastic Armstrong	2.17 [0.42, 12.17]	54	nr	2 weeks	91 [182]	[5.49]	nr

Author PMID Country	Design (recruitment period)	Tube Type [arm desc.]	Age (SD) [min, max]	male	rAOM [COME]	Followup	N [ears]	% Otorrhea	Definition
		beveled TT [receiving neomycin sulfate-polymyxin B sulfate- hydrocortisone otic drops]							
Wallace 15533143 UK	prosp rct (2001- 2002)	Shepard or T tube [reviewed at 1 month only]	7.00 [2.00, 15.00]	69.7	87.9	1 month	29	20.69	nr
Wallace 15533143 UK	prosp rct (2001- 2002)	Shepard or T tube [reviewed at 1 week and at 1 month]	6.00 [1.00, 13.00]	63.6	75.8	1 month	26	11.54	1 month follow up

Forty-seven studies^{1, 4, 6, 11, 13, 14, 16-22, 25-28, 32, 33, 39, 43, 49-51, 53, 55, 57, 59-61, 63, 83, 85-99} (representing 63 cohorts) report on otorrhea associated with placement of tympanostomy tubes (TT). Thirty-four studies were cohorts^{1, 4, 14, 16, 18, 19, 21, 22, 25-28, 32, 33, 39, 49, 50, 53, 57, 59-61, 63, 83, 85, 88, 90, 92-97, 99} (28 prospective^{1, 4, 14, 16, 18, 19, 21, 22, 25-27, 32, 33, 50, 57, 59-61, 63, 83, 85, 88, 90, 93-97}, 2 retrospective^{53, 99}), six studies were nonrandomized comparative studies^{11, 17, 55, 86, 87, 98}, and seven studies employed a randomized controlled trial design^{6, 13, 20, 43, 51, 89, 91}. Years of recruitment range from 1977 to 2012. Patient age ranged from 0.11 to 23.7 years^{6, 11, 13, 17, 19-21, 27, 43, 51, 55, 86, 89, 91}. Percentages of males enrolled in these studies ranged from 44 to 69.7 percent with a mean of 58.75 percent^{6, 11, 13, 17, 20, 21, 27, 43, 63, 86, 87, 89, 91}. Twenty-six studies reported zero to 91 percent of patients had recurrent acute otitis media (rAOM) and 7.5 to 100 percent of patients had chronic otitis media with effusion (OME)^{1, 4, 16, 18-21, 25, 27, 32, 33, 39, 43, 50, 51, 53, 57, 59-61, 63, 91, 92, 94, 96, 97}. Follow up times ranged from two weeks to ten years or until extrusion. Study sample size ranged from 15 to 1,360 patients with a mean of 182 patients. Studies that reported sample size in terms of ears enrolled 50 to 2,604 ears with a mean of 427 ears. A median of 20.6 percent of patients (25th percentile: 12%, 75th percentile: 38.3%) experienced otorrhea. A median of 10.5 percent of ears (25th percentile: 7.5%, 75th percentile: 15.5%) experienced otorrhea.

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Appendix J: Network Metaanalysis Model, Inconsistency Analysis Results and Illustrative Trace and Posterior Density Plots

The meta-analysis models used in this report are described here in a technical manner. We describe the network meta-analysis model, noting that the simple meta-analysis model is a special case of the network model, setting the number of treatments (nodes) to 2.

Network Metaanalysis Model

The network meta-analysis model is a hierarchical model that has an observational and a structural part (model).

Observational model

$$y_{kj} \sim N(\mu_{kj}, \sigma_{kj}^2), \text{ and}$$

$$\mu_{kj} = \mu_k + \mathbf{X}\mathbf{T}_k,$$

with $k=1, \dots, K$ indexing the K studies, and $j=1, 2, \dots$ indexing treatment arms. y_{kj} is the mean of the modeled continuous outcome in arm j of study k . \mathbf{X} is a design matrix corresponding arms to treatment effects. $\mathbf{T}_k = (T_{k1}, \dots, T_{k,N-1})'$ is a column vector of study-specific treatment effects for the $N-1$ treatments versus a reference treatment, which is chosen arbitrarily. μ_k is the mean in study k for the reference treatment.

Structural model

Between studies, the study-specific treatment effects are modeled with a multivariate normal distribution

$$\mathbf{T}_k \sim N(\mathbf{T}, \mathbf{\Omega}),$$

where $\mathbf{\Omega}$ is a compound symmetry matrix of dimension $N-1$, with all diagonal elements equal to τ^2 and all off diagonal elements equal to $\tau^2 / 2$, and $\mathbf{T} = (T_1, \dots, T_{N-1})'$ is a column vector of $N-1$ between-study effect means.

Hyperparameters

We used normal hyperpriors for means and a uniform prior for standard deviations. Specifically, $\mathbf{T} \sim N(\mathbf{0}, c\mathbf{I})$ and

$$\tau \sim U(0, m)$$

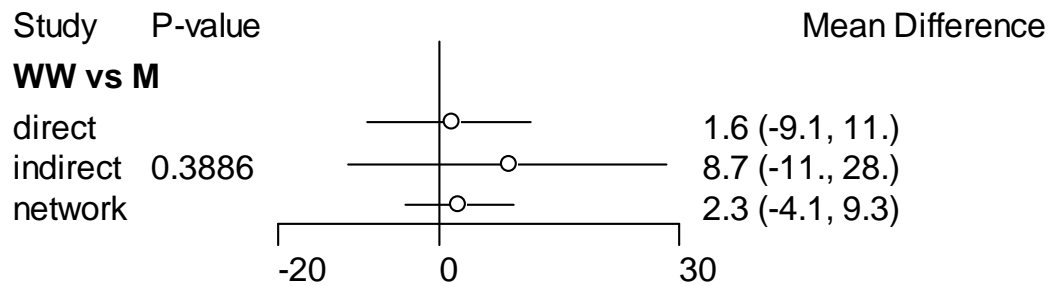
where $\mathbf{0}$ is a column vector of zeros, \mathbf{I} a conformal identity matrix and c and m scaling factors that are set to 15 and 5 times the range of observed effects, respectively.

To check for inconsistency we conducted split node analyses. We replaced each treatment effect $T_j, j > 0$ that compares the j -th treatment with the baseline one ($j = 0$), with a direct effect, and an indirect effect, separating the contributions of head-to-head evidence and indirect evidence and examined whether the difference between them was beyond 0.

Inconsistency Analysis Results

An ensemble of relevant node-splitting models were generated. Results of direct vs. indirect vs. entire network are plotted below along with inconsistency Bayesian P values for each split comparison.

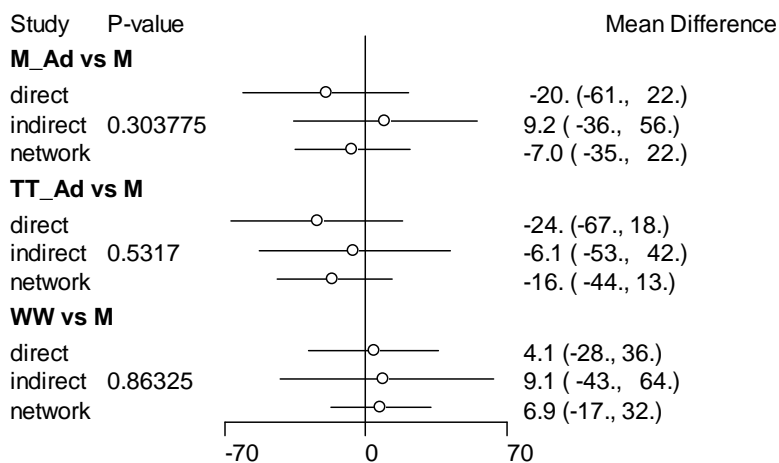
KQ 1: Early Hearing Levels



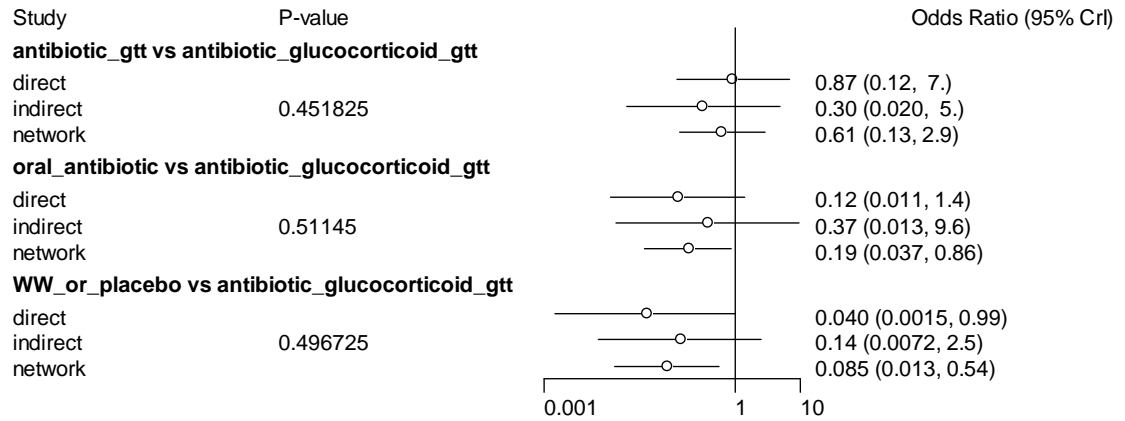
KQ 1: Late Hearing Levels

There cannot be inconsistency in this network, given that estimates arise from a single trial with three arms.

KQ 1: Duration of Middle Ear Effusion Network



KQ 5 Network



Illustrative Trace and Posterior Density Plot

